Essays on risks in the tourism industry

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Yelka Eggenschwiler

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Yelka Eggenschwiler

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1 Introduction

This thesis consists of four essays on risks in the tourism industry. Although risk may entail positive and negative outcomes, it is typically only associated with undesirable outcomes. In accordance with this notion, the Oxford English Dictionary (2018) defines risk as the "(Exposure to) the possibility of loss, injury, or other adverse or unwelcome circumstance; a chance or a situation involving such a possibility." The subject of risk has been discussed and examined across a wide range of disciplines. Risk was first incorporated in the economic literature by Knight (1921), who suggested that risk is a critical component of any economic activity. In order to understand theoretical economic approaches towards risk one should differentiate between the concepts of risk and uncertainty. This differentiation is usually accredited to Knight (1921), who argued that risk describes measurable or known uncertainty while real uncertainty describes unmeasurable or unknown uncertainty. Accordingly, in theory, risk refers to situations or decisions, in which probabilities for the occurrence of different outcomes are known (Tversky & Kahneman 1992). In reality, in almost any economic activity risk and uncertainty are found combined in different proportions, and uncertainty can often not be eliminated completely. Thus, most decisions will be made under some extent of uncertainty. Even if probabilities are unknown, meaning uncertainty is present, producers and consumers will develop beliefs and perceptions about probabilities. Therefore, several scholars suggest that uncertainty is equivalent to perceived risk. Perceived risk might vary between different persons for the same level of real risk. It is argued that both real and perceived risk will influence the decision-making of producers and consumers. For this reason, the focus of the discussion is increasingly shifting away from the strict conceptual differentiation between risk and uncertainty towards the modeling of the behavior of different agents using different measures for risks and controlling for individual characteristics such as for instance risk aversion.

Notwithstanding the different ideas and discussions of risk, it is accepted that risk is ubiquitous and inherent in virtually every activity. Consistent with its ubiquity, risk is inherent in the tourism industry and its activities. Risk has an influence on guests, touristic businesses as well as on entire destinations. A tourist might evaluate the probability of a terrorist incident in several destinations when choosing the destination for her next trip. A hotel manager might be faced with the possibility of food contamination in the hotel's restaurant, which might damage its reputation and consequently affect its finances negatively. Even the tourism industry of an entire destination or region might be at risk due to the possibility of an outbreak of a disease or the threat of political turmoil. For many countries, among them Switzerland, the tourism industry is an important export sector and, particularly in

rural areas, an important job provider. Thus, it is vital to understand how risks, whether real or perceived, influence the tourism industry and how they can be managed.

In line with the primarily demand-driven character of the tourism industry, risk in the tourism literature has often been discussed from a demand side perspective, mostly focusing on the impact of a specific risk factor in a specific region on tourism demand in that region. Thereby, risk factors might involve anything from a disappointing travel experience to a serious threat to the tourist's physical integrity. Tourism demand for a destination can be explained by tourists' travel decision-making, which is a complicated process with many factors influencing the outcome (Sönmez & Graefe 1998). Risk can be an overriding factor in a travel decision, causing travelers to change their travel plans. Generally, tourists will choose the trip that provides them with the highest utility, taking into account both benefits and costs. While there is a limited number of adventure tourists (Neumayer 2004) and sensation seeking tourists (Lepp & Gibson 2008), which might be less deterred by risk factors or even gain a benefit from them, for most tourists, risk constitutes a cost. Consequently, an increase in risk in a trip will decrease its utility for the tourist. This can induce a substitution towards an alternative trip or stop the tourist from travelling altogether. Therefore, it is assumed that risk has an adverse effect on tourism demand and consequently on the local economy. To what extent a risk factor influences the choices of a tourist depends on a wide range of factors, for instance on the tourist's perception of risk, the tourist's risk aversion, but also on the characteristics of the destination involved.

The influence of risk on the tourism industry can also be investigated from a supply side perspective, by focusing on how touristic suppliers, such as for instance hotels, are affected by risks and how these risks can be managed on the firm-level. From a supply side perspective, risk is usually understood as the possibility of insufficient profits or losses. The sources of risks a firm is exposed to might be categorized in many ways. A common categorization is the differentiation between internal risks and external risks (Beretta & Bozzolan 2004). Internal risks arise due to a firm's characteristics such as for instance its financial structure and its firm strategy. External risks arise due to changes in a firm's environment, such as for instance a financial crisis, increased competition or political turmoil. To what extent a touristic firm is exposed to risk will thus significantly depend on its characteristics, strategy and environment. Several studies investigate the risk exposure and management for large, listed and often multinational firms and show that the risks a firm is exposed to can be reduced significantly by professional risk management. In many countries, including Switzerland, the tourism industry is small-scaled (Buhalis & Peters 2006)

and exhibits a large degree of heterogeneity regarding firm and management characteristics. Therefore, it is suggested that these findings regarding risk exposure and management might not be readily transferable to small touristic firms (Pennings & Garcia 2004; Bartram *et al.* 2009).

The four papers presented in this thesis contribute to the literature on risks in the tourism industry. This thesis looks at risk factors from both the demand and the supply side. Specifically, the first two papers, which are presented in chapter 2 and chapter 3, focus on the effect of travel risks on tourism demand. The latter two papers, which are presented in chapter 4 and chapter 5, consider the exchange rate risk exposure and management in the Swiss hotel industry.

Chapter 2 contributes to the literature on the effect of risk factors on tourism demand. Several case studies investigate the effect of a particular risk factor on a certain country or region (Dimanche & Lepetic 1999; Arana & León 2008). The paper presented in this chapter goes further than many existing studies, by investigating the effect of various risk factors on tourism demand for a large sample of countries and years, which allows a comparison of the importance of the different risk factors under study.
Specifically, this paper investigates the effect and importance of the risk factors terrorism, political violence, crime and health risks in different geographical regions on Swiss tourists' destination choices using panel data from over 100 countries for the period 1995-2016. Fixed-effects (FE) and dynamic generalized method of moments (GMM) estimation techniques are applied.
The results reveal that political violence and crime in a destination negatively affect tourist arrivals from Switzerland. Terrorism incidents and health risks are less important. The evidence also indicates that the relevance of risk factors to Swiss tourist arrivals differs depending on the destination's region. In addition, the results show strong evidence that Swiss tourist arrivals increase with GDP, openness and a favorable exchange rate.

Chapter 3 contributes to the literature on the effect of terrorism on tourism demand. Terrorism in a destination is generally accepted to have a detrimental effect on its tourist arrivals (Arana & León 2008). However, evidence is sparse and inconclusive about spillover effects, in other words, about the effect of terrorism in one country on tourism in other countries.
The paper investigates the effect of terrorism in Western Europe on tourist arrivals in Switzerland for the period 2005-2017 by applying a seasonal autoregressive moving average model with exogenous variables (SARMAX) approach. Specifically, it sheds light on how

tourist arrivals in Switzerland from different source markets are influenced by terrorism in Western Europe and how the effects differ between the various markets of origin.
The results indicate that terrorism in Western Europe has no effect on aggregate tourist arrivals in Switzerland. However, the evidence suggests that the effect of terrorism in Western Europe on tourist arrivals in Switzerland differs substantially between different source markets and both negative spillover effects as well as substitution effects are present. While the effect on arrivals from Asian source markets was found to be mostly negative, a positive effect on the arrivals from the US and most European markets was found. Further analyses reveal that the results are mostly driven by large-scale Islamist terrorist incidents.

Chapter 4 and chapter 5 contribute to the literature by focusing on the exchange rate exposure and risk management of small- and medium-sized touristic firms. A large number of studies addresses these topics for large, listed and often multinational companies (e.g. Pramborg 2005; Dominguez & Tesar 2006; Döhring 2008; Bartram *et al.* 2010; Ito *et al.* 2016). However, for small- and medium-sized touristic firms, a research gap exists. During the last decade, the Swiss franc has been appreciating against most major currencies, especially against the euro. This led to a loss of price competitiveness in the Swiss tourism industry, since the exchange rate is a key determinant of price competitiveness (Mangion *et al.* 2005). Due to the Swiss hotel industry's small-scaled, but international character, it presents an interesting setting to investigate exchange rate exposure and management.

Chapter 4, which is joint work with Monika Bandi, develops a conceptual framework describing the factors affecting the exchange rate exposure of hotels and the role exchange rate risk management plays in mitigating that exposure. Based on multiple case studies in Switzerland, the paper explores these issues and thereby illustrates the conceptual framework.
It finds that most investigated hotels have very little transaction or translation exposure because they employ the strategy of choosing the Swiss franc as their invoicing currency and therefore translate the exchange rate risk to their guests. The case study analysis indicates, however, that Swiss hotels exhibit substantial economic exchange rate exposure, which is evident in the form of a loss of price competitiveness and consequently in declines in demand. The study reveals that a hotel's guest structure is the key factor in explaining its exchange rate exposure. Furthermore, it finds that even though exchange rate exposure is reported to be substantial for most hotels, their exposure is barely hedged. The primary reason for this is the lack of professional exchange rate risk management. The paper reveals that there is considerable potential to improve hotels' exchange rate risk

management. Based on this potential, the paper suggests a variety of strategies and implications to enhance hotels' competitiveness.

Chapter 5 investigates the use of exchange rate risk management in the Swiss hotel industry and examines what factors favor its use based on firm-level survey data.
The results show that the large majority of hotel managers makes use of price policy and payment practice strategies such as passing-through exchange rate changes to prices and local currency invoicing. Some hotel managers additionally use operational hedging, whereas financial hedging is barely used. Overall, the current level of resources available and the knowledge regarding exchange rate risk management in the industry are assessed as low. The evidence of the study indicates that exchange rate exposure, a high star classification, size and innovativeness are important factors in determining the use and the extent of use of exchange rate risk management.

2 The effect of risk factors on Swiss outbound tourism: A panel data analysis

2.1 Introduction

The tourism industry is one of the largest in the world and for the last eight years it has been exhibiting a consistent growth trend of around 4% per year. In 2017, destinations worldwide counted 1,323 million international tourist arrivals (World Tourism Organization 2018).

Most tourists are longing for risk-free vacations or business trips. Therefore, risk factors such as terrorism (Arana & León 2008), political violence (Neumayer 2004), crime (Ferreira & Harmse 2000; Levantis & Gani 2000) and health concerns are expected to have a detrimental effect on tourist arrivals.

Apart from case studies investigating the effect of a specific incident such as a terrorist attack or the effect of a particular risk factor on a certain country or region (Enders & Sandler 1991; Dimanche & Lepetic 1999; Arana & León 2008), relatively little attention has been given to the effect of risk factors on tourism demand. The literature lacks a comprehensive study investigating the effect of various risk factors on tourism for a large sample of countries and years. Since most studies focus on a narrowly defined group of risk factors and on a geographically constrained region, comparability of the results across the different studies is often not given and a comparison of the importance of different risk factors is impeded. Furthermore, not all guest segments (e.g. tourists from different source countries) react to risk factors in the same way. Pizam *et al.* (2004) point out that different nationalities differ considerably in their risk-taking behavior when travelling. For travel agencies and tour operators it is crucial to understand the behavior of their clients towards risk factors, so that they can react accordingly in their planning. In 2016, the Swiss travel agency business generated a gross value added of 903 million Swiss francs and a revenue of 8,018 million Swiss francs (Federal Statistical Office 2017). Further, 13,020 full-time equivalents were employed in the sector in 2016 (Federal Statistical Office 2017). Consequently, the industry plays a significant role in the Swiss tourism sector. Furthermore, despite its rather small population, Switzerland is considered an important source market for many destinations. Understanding how risk factors influence the behavior of tourists from a major source market might provide guidance for managing risks.

This paper is the first to investigate the effect and importance of several risk factors on the behavior of Swiss outbound tourists. Specifically, this paper seeks to shed light on how Swiss outbound tourists react to the risk factors terrorism, political violence, crime and health risks and to investigate if their reaction differs in magnitude depending on specific risk factors. For example, a relatively strong increase in the level of crime might not have

a strong effect, while a terrorist attack widely covered by the media might influence the Swiss outbound tourists to a greater extent. Furthermore, this paper aims to reveal if tourists react differently to risk factors depending on the location of the destination. Swiss tourists might for example react less strongly to risks in European countries, since they might be better informed about the actual level of risk in these countries than in more distant destinations.

The remainder of this paper proceeds as following. Section 2 reviews the most important findings regarding risk factors and other determinants of tourism demand. Section 3 reviews the data and methodology used to conduct the research. Section 4 presents the results, section 5 discusses them and puts them into context. Finally, section 6 concludes.

2.2 Related literature

Risk factors

Tourists can be seen as rational consumers who allocate their income between various goods and services, among them tourist trips (Enders & Sandler 1991; Enders *et al.* 1992). When comparing different travel options, tourists will choose the trip that provides them with the highest utility. If two travel options provide the same benefit, then the tourist will choose the one with the lower relative price (Enders & Sandler 1991). Prices of tourist trips depend on monetary costs, but also on risk factors associated with the travel (Enders *et al.* 1992). While there is a limited number of adventure tourists (Neumayer 2004) and tourists interested in sensation seeking tourism (Lepp & Gibson 2008), which might be less deterred by risk factors or even gain a benefit from them, the large majority of tourists, which make up the mass tourism market, desire a relaxing and carefree holiday. Faced with risk factors of a destination, potential tourists might fear for their physical integrity, worry about being involved in stressful situations or being unable to visit attractions according to schedule (Neumayer 2004). Furthermore, official authorities might publish travel advice against travelling to a certain country. Consequently, ceteris paribus, an increase in risk in a destination will increase its relative price, inducing the consumer to substitute it for another destination. Therefore, it is expected that risk factors have a negative effect on tourism. Previous studies have identified terrorism, political violence, crime and health concerns as the four main risk factors for tourists (Lepp & Gibson 2003).

Terrorism

Terrorist attacks have been occurring with regular frequency. Thereby tourists have often been incidental victims of attacks or have even been purposely targeted as victims. The

rationale behind the effect of terrorism on tourism is that terrorist attacks damage the image of a destination and stop tourists from visiting. Potential tourists might then decide not to travel at all or switch to a destination that is perceived as safer.

The majority of studies investigating the effect of such attacks on tourism are case study analyses, focusing on a specific incident and region. Enders *et al.* (1992) show for instance for several European countries that terrorist attacks have a negative effect on tourism. Goodrich (2002) discusses the negative effects of the 9/11 attacks on the tourism industry in the US. For the case of Israel, Pizam and Fleischer (2002) find a negative effect of terrorism on tourism as well. Feridun (2011) confirms the negative impact of terrorism on tourism for the case of Turkey. For the case of Pakistan, Raza and Jawaid (2013) find a significant negative effect of terrorism on tourism both in the short as well as in the long run. Drakos and Kutan (2003) develop a consumer-choice theoretical model in order to test regional effects of terrorism on competitors' market shares in the tourism industry focusing on Greece, Israel and Turkey for the time span of 1991 to 2000. They find significant own and spillover effects of terrorism incidents on market shares.

Relatively few studies use panel data for a multitude of countries in order to analyze the effect of terrorism on tourism. For instance, Saha and Yap (2014) analyze the effect of terrorism on tourism using panel data from 139 countries for the period of 1999-2009 by taking into consideration interaction effects between political instability and terrorism. Overall, they find that terrorism is less important than political instability. Contrary to the expectation, they find that terrorist attacks actually increase tourism demand in countries with a low to moderate level of political risk. For higher levels of political instability, however, terrorism lowers the number of tourist arrivals. Liu and Pratt (2017) investigate the relationship between terrorism and tourism in 95 countries for the period of 1995-2012. From a global perspective, they find no long-run effect of terrorism on international tourism demand and only a small effect in the short run. In fact, they find a long-run effect of terrorism on tourism demand for only 9 out of the 95 analyzed countries and a short-run effect for only 25 out of the 95 countries, concluding that tourism is overall rather resilient to terrorism.

Political violence

The literature on the effect of political violence on tourism is sparse. Most studies focus only on the influence of terrorism on tourism, but do not take into account other forms of political violence such as violent conflicts and wars. The hypothesis that these forms of political violence have a negative effect on tourism is thus largely based on case study evidence and a few quantitative studies confined to a small sample of countries.

Bhattarai *et al.* (2005) discuss for instance the effect of the Maoist war on tourism in Nepal and evaluate it as negative. For the case of China, Chen *et al.* (2007) find that the Tiananmen Square protests of 1989 had a negative effect on tourist arrivals. Fletcher and Morakabati (2008) discuss the effect of severe political instability on tourism for the cases of Kenya and Fiji and suggest that these effects are larger than those of a low-to-medium one-off terrorist attack. Neumayer (2004) appears to be the first to test the hypothesis that political violence deters tourism by applying a comprehensive panel data analysis for a large set of countries. He finds strong evidence that human right violations, conflict and other politically motivated violence has a negative effect on tourist arrivals. Furthermore, there is some evidence indicating that autocratic regimes might have less tourist arrivals than more democratic regimes, even if they do not resort to violence. Finally, the results suggest the presence of intraregional, negative spillovers and cross-regional substitution effects. Similarly, looking at a large panel data set including 139 countries and covering the period 1999-2009, Saha and Yap (2014) find that political instability has a considerable adverse effect on tourism.

Crime

Despite the potential importance of crime as a risk factor for tourists, only a small number of studies investigates the effect of crime on tourism. Most papers are case studies, focusing on a geographically constrained region. Thereby, several studies analyze the effect of crime on tourist arrivals in island destinations, mostly in the Caribbean. In the case of Jamaica, Alleyne and Boxill (2003) find that while negative, the impact of an increase in the crime rate on tourist arrivals is overall relatively small. However, a more detailed analysis reveals that an increase in the crime rate significantly lowers tourist arrivals from the European market. Similarly, Lorde and Jackman (2013) find that in the case of Barbados, an increase in the crime rate has a negative impact on tourist arrivals on the island. Mohammed (2015) investigates the effect of violent crime as well as property crime on tourist arrivals in the destinations Jamaica and Trinidad and Tobago. The results suggest that both types of crime have detrimental effects on tourist arrivals in the destinations under study. Levantis and Gani (2000) investigate the effect of crime on touristic demand for a set of developing island economies of the South Pacific and the Caribbean and evaluate it as negative. They conclude that notwithstanding the inaccessibility of current crime statistics, potential tourists from source countries seem to learn about a deteriorating law and order situation in the destinations.

Parida *et al.* (2018) confirm the findings that crime has a negative effect on tourist arrivals for the case of India. Similarly, for a set of European countries, Altindag (2014) finds that violent crime has on average a negative effect on international tourist arrivals as well as

on tourism revenues, with the latter mostly being driven by a lower number of tourists rather than by lower spending.

Turning the causality around, Biagi and Detotto (2014) investigate whether tourism leads to an increase in crime in Italy. Based on the work of Nobel laureate Gary Becker (1968), who argues that committing a crime is a rational choice of an agent maximizing his utility, it is suggested that since tourists are presumably wealthier than the local population, their presence might increase the returns on crime and consequently the crime rate. Biagi and Detotto (2014) find empirical evidence that in Italy, the presence of tourism increases the level of street crime, especially pickpocketing.

Health concerns

The literature on the effect of health threats on tourism is often of qualitative nature or focuses on a specific medical epidemic. For instance, based on in-depth interviews and the analysis of popular guidebooks, Carter (1998) finds that while Europe and North America are considered as safe destinations regarding health risks, Africa is seen as dangerous, leading people to think it should be avoided, while Asia is perceived to be risky, but worth visiting nonetheless.

Regarding the literature on specific medical epidemics, a relatively large number of studies focuses on the effect of SARS[1] on tourism. Breda and Costa (2006) as well as Chen *et al.* (2007) analyze the effect of SARS on tourism in China and find a considerable negative impact on international tourist arrivals. Both Wang (2009) and Min *et al.* (2011) study the impact of SARS on Japanese tourist arrivals in Taiwan and find a negative effect. Kuo *et al.* (2008) as well as McAleer *et al.* (2010) analyze the impact of SARS on tourist arrivals for a set of Asian countries and find that tourist arrivals decreased significantly in countries affected by SARS. Wilder-Smith (2006) additionally finds that the psychological impacts of SARS combined with travel restrictions imposed by various authorities lead to a decrease in international travel, which affects destinations far beyond those actually hit by SARS. Thus, it can be concluded that the studies investigating the impact of SARS on tourism consistently find a negative effect.

Some of these studies additionally investigate the impact of avian flu on tourist arrivals. Both Chen *et al.* (2007) and Kuo *et al.* (2008) do not find a significant impact of avian flu on tourist arrivals. In contrast, McAleer *et al.* (2010) find some evidence that fatalities caused by avian flu reduce tourist arrivals. However, they find that avian flu is less important to international tourist arrivals than SARS.

[1] severe acute respiratory syndrome

Regarding other types of diseases, Haque and Haque (2017) show that the swine flu had a negative effect on tourism in Brunei. Likewise, Page *et al.* (2012) find a negative impact of the swine flu on international tourist arrivals to the United Kingdom.

Risk perception and the role of the media

Two main strands can be differentiated in the literature regarding the effect of risk factors on tourism demand. While an important strand of literature analyzes the impact of actual risks on tourism demand, another strand emphasizes the importance of risk perception. It is argued that, although frequently highly correlated, the degree to which tourists react to risk factors depends on their risk perception regarding a destination rather than on the actual level of its riskiness (Rittichainuwat & Chakraborty 2009).

Risk perception, which by definition is subjective, can be affected by a range of factors, among them a variety of tourists' characteristics such as e.g. personality traits (Fuchs 2013), nationality (Seddighi *et al.* 2001; Pizam *et al.* 2004; Kozak *et al.* 2007; Güres *et al.* 2011) or previous travel experience (Rittichainuwat & Chakraborty 2009; Ingram *et al.* 2013).

Beyond such factors, it is commonly accepted in the literature that media coverage of risks is a key element in shaping tourists' perception of riskiness of a destination (Cavlek 2002; Kapuściński & Richards 2016). It is argued that potential tourists have imperfect information about the risks associated with tourism in a certain destination. Because of a lack of personal experience with risk factors, tourists will rely on secondary sources of information. It is argued that the media expresses itself more easily understandable than statistics of actual events (Wahlberg & Sjoberg 2000). When information is costly, tourists may therefore use the intensity of media coverage as a proxy for the level of risk involved, interpreting the intensity of coverage as an indicator for the extent of concern among experts regarding a risk factor (Fielding & Shortland 2009). Furthermore, a more intense media coverage of risks might increase their perceived frequency, regardless of their true occurrence (Fielding & Shortland 2009).

Studies suggest that risk framing, which refers to the way risks are portrayed in the media, might substantially influence risk perception (Dudo *et al.* 2007; Hove *et al.* 2015; Kapuściński & Richards 2016). Consequently, media coverage of risk factors is commonly associated with the production of a distorted understanding of risk levels in a destination (Chew & Jahari 2014). While some risks might be dramatized others might be trivialized by the media. Wahlberg and Sjoberg (2000) show, however, that the media is often not as biased as commonly perceived. Furthermore, they argue that it is not so much the content, but the amount of media coverage regarding risk factors that influences risk perception.

While the majority of empirical studies investigating the effect of risk factors on tourism demand still relies on actual cases, some try to estimate the effect of media coverage on risk perception and some go a step further and estimate the effect of media coverage via risk perception on tourism demand. Kapuściński and Richards (2016) e.g. evaluate the effect of different media portrayals of the risk factors terrorism and political instability on the perception of these risks. They find that when judging the risk involved in visiting a destination subject to terrorism, tourists are less sensitive to information about the characteristics of the attack and draw conclusions mainly from the fact that the attack took place. In contrast, regarding political instability, they find that the portrayal of these risks influences the risk perception and that tourists are mainly worried about severe incidents in touristic areas. In the case of Thailand, Ingram *et al.* (2013) find that despite negative media reports about political instability, the destination is viewed relatively favorably among potential tourists. They find that tourists, which have previously visited Thailand view the destination more favorably and less often report a negative impact of political instability than those who had not visited it before (45% versus 87%). Fielding and Shortland (2009) investigate the impact of both the actual intensity of the Israeli-Palestinian conflict and the intensity measured by the US television news coverage. They find that while tourists react to actual Israeli casualties, they react to reported Palestinian casualties. This difference might be explained by information asymmetry, suggesting that US tourists are able to gain access to data about Israeli casualties very easily, but are required to rely more heavily on the media in order to assess the number of Palestinian casualties. Looking at Aruba, Brown (2015) finds that prolonged negative US media coverage of a murder case in Aruba lead to a significant decrease in US tourist arrivals to Aruba.

Still, the large majority of studies regarding the influence of media coverage on risk perception rely on self-reported values of risk perception (Fielding & Shortland 2009). Thus, it often remains unclear, how and if changes in risk perceptions will affect the actual behavior of tourists (Kapuściński & Richards 2016).

Determinants of tourism demand

Apart from risk factors, a variety of other factors might contribute to explaining international tourism demand. There is no general consensus on which variables are important in explaining international tourism demand and studies differ considerably in the set of variables they include as controls (Crouch 1994; Eilat & Einav* 2004).

One of the least controversial determinants of international tourism demand is price. It is widely accepted that changes in price competitiveness, which lead to changes in costs for tourists, are a key factor in touristic demand (Dwyer *et al.* 2000; Masiero & Nicolau 2012; Peng *et al.* 2015). However, including tourism prices as a control imposes a challenge to

empirical tourism research, since indices for tourism prices are not readily available (Eilat & Einav* 2004). Therefore, often exchange rates are used as a proxy for prices (Khadaroo & Seetanah 2007; Poprawe 2015). Some studies try to control for the price effect by including the exchange rate between the local currency and the USD (e.g. Khadaroo & Seetanah 2007). However, this exchange rate cannot be expected to reflect changes in the cost of holidays for visitors from all source markets. Not surprisingly, Khadaroo and Seetanah (2007) do not find a significant effect of prices on international arrivals. Thus, ideally, bilateral exchange rates should be used. Apart from price factors, studies frequently include qualitative characteristics of a destination such as touristic attractions, climatic or cultural variables (Dwyer *et al.* 2000). Country-specific prosperity variables of a destination such as GDP or political attributes such as openness are, however, argued to be insufficiently accounted for in tourism demand studies (Poprawe 2015). Finally, some studies control for socioeconomic and demographic factors of the different source countries such as for example population development, income, leisure time or education (Dwyer *et al.* 2000; Turner & Witt 2001).

2.3 Data and methodology

2.3.1 Data and variables

2.3.1.1 Tourism demand

In order to measure outbound tourism of Switzerland, data on arrivals is drawn from the United Nations World Tourism Organization (UNWTO). Tourist arrivals are the most popular measure of tourism demand in the literature (Song & Li 2008). The available data covers 150 countries in the time span of 1995-2016. However, for many countries, the data exhibits substantial gaps. Since outbound tourism statistics of many countries - including Switzerland - are limited or not available, the UNWTO estimates data for countries' outbound tourism flows based on data supplied by the destination countries. The data therefore corresponds to arrivals of Swiss tourists in destination countries. The dependent variable is *Swiss Arrivals* and represents the total Swiss arrivals per country. Following Neumayer (2004), I take the natural log of the arrivals in order to make its distribution less skewed and mitigate potential problems with heteroscedasticity.

While the data is frequently used in the literature without mentioning any issues regarding data comparability (e.g. Neumayer 2004; Poprawe 2015), it should be noted that since the data is obtained by each of the destination countries, the sources of information vary. To mitigate potential issues of comparability between countries as much as possible, data on

arrivals of Swiss tourists at national borders was used whenever available.[2] In cases in which the number was not available, data on Swiss visitors at national borders was used. Thereby, a visitor is classified as a tourist (or overnight visitor) if his/her trip includes an overnight stay, or as a same-day visitor (excursionist) otherwise. With the exception of Switzerland's neighboring countries Germany, France, Italy, Austria and Liechtenstein, it is assumed that the number of arrivals of visitors and tourists is very similar. Since these countries are also members of the Schengen area, accommodation data is used for these countries, which automatically implies arrivals of tourists and not of same-day visitors. Finally, for the few countries that provided data neither on arrivals of tourists nor of visitors at the national border, data on arrivals at accommodation establishments was used as well, even if the countries were non-Schengen members.

2.3.1.2 Risk factors

Terrorism

In the literature, terrorism is often measured using different types of indices. Several terrorism databases exist. One of the best known is the International Terrorism: Attributes of Terrorist Events (ITERATE) database. However, this database is only available for members of the Duke University Community or against a substantial fee. Another frequently used database is the Rand Database of Worldwide Terrorism Incidents (RDWTI). A disadvantage is that the data is only available up to 2009. A similar problem exists with the Protocol for the Assessment of Nonviolent Direct Action (PANDA) data set and the World Incident Tracking System (WITS), which only provide data for the years of 1984-1995 and 2004-2010 respectively. Regarding completeness and accessibility, the best data source appears to be the Global Terrorism Database (GTD). This is an open-source database maintained by the National Consortium for the Study of Terrorism and Responses to Terrorism (START) at the University of Maryland. The database includes information on terrorist events from around the world from 1970-2016. In contrast to many other event databases, the GTD contains systematic data on domestic as well as on transnational and international incidents that have occurred in this time span. For each incident, the database

[2] The exception are members of the Schengen Area, since in this area border checks have largely been abolished. The use of data on arrivals at national borders would lead to an underestimation of actual arrivals. Therefore, for these countries, whenever available (not available for Greece, Malta and San Marino), data on arrivals at accommodation establishments was used. Members of the Schengen Area are the following: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and Switzerland. Further, Monaco, San Marino and Vatican City have open borders with the area.

provides information on the date and location of the incident, the weapons used, the number of casualties (both fatal and non-fatal) and if possible, the group or individual responsible for the attack.

In this study, data from the Global Terrorism Database for the years 1995-2016 is used (National Consortium for the Study of Terrorism and Responses to Terrorism (START) 2018). As a measure of terrorism, I construct the variable *Terror*, which is a measure of the sum of the number of confirmed fatalities and non-fatal injured persons per year in a given country. Based on the argument that terrorism has a negative effect on tourism demand, the coefficient of the variable is expected to be negative.

Political violence

Data about political violence is drawn from the Uppsala Conflict Data Program (UCDP). The UCDP is a data collection project on armed conflicts and organized violence. Data from the UCDP is available since 1946 and is relatively widely used in the literature (Neumayer 2004; Poprawe 2015). For this study, data from the UCDP Georeferenced Event Dataset (GED) for the years 1995-2016 is used (Sundberg & Melander 2013; Croicu & Sundberg 2017). This dataset is UCDP's most disaggregated dataset, covering individual events of organized violence. Thereby an event is defined as "an incident where armed force was used by an organized actor against another organized actor, or against civilians, resulting in at least 1 direct death at a specific location and a specific date" (Croicu & Sundberg 2017). The dataset contains three estimates on the number of fatalities; the lowest reliable estimate of total fatalities, the highest reliable estimate of total fatalities and the best (most likely) estimate of total fatalities resulting from an event (Croicu & Sundberg 2017). As a measure for political violence, the variable *Political violence*, which is constructed as the sum of total fatalities from events per country and year using the best estimate of total fatalities, is used in this study. Based on the argument that political violence such as war, conflict and political instability has a negative effect on tourism demand, the coefficient of the variable is expected to be negative.

Crime

Cross-country studies using data on crime face the problem that official crime data statistics are often not comparable across countries. The level of underreporting crimes differs between countries and the definition of crimes might vary as well. In fact, it is assumed that most non-violent crimes suffer from underreporting. For this reason, in the literature sometimes the rate of (intentional) homicides is used as a proxy for violent crime (Fajnzylber *et al.* 2002; Lederman *et al.* 2002). It is argued that this type of crime suffers least from underreporting. Furthermore, the incidence of homicide is highly correlated with the incidence

of other violent crimes. Following this literature, I use the rate of homicides as the proxy for violent crimes and crime in general.

The data originates from the United Nations Office On Drugs and Crime (UNODC)'s International Homicide Statistics database and is drawn from the World Bank's World Development Indicators (WDI) (United Nations Office On Drugs and Crime 2018). The data is available on country-level for the years 1995-2015. The variable *Crime* measures the intentional homicides[3] per 100,000 people. Based on the argument that crime has a negative effect on tourism demand, the coefficient of the variable is expected to be negative.

Health risks

As a proxy for health risks, I take into account major outbreaks, epidemics and pandemics. Since this analysis focuses on Swiss outbound tourists, it aims to include all outbreaks, epidemics and pandemics deemed relevant to Swiss tourists travelling abroad. Therefore, the analysis takes into account all current and past outbreaks, epidemics and pandemics which are listed on the German and French versions of the Federal Office of Public Health FOPH's webpage and which occurred in the period of 1995-2016 in countries other than Switzerland (Federal Office of Public Health 2017). This procedure leads to the inclusion of the following outbreaks, epidemics and pandemics: the severe acute respiratory syndrome (SARS), the Influenza A (H1N1) virus, the Ebola virus disease, the Middle East respiratory syndrome (MERS) and the Zika virus.

Surprisingly, avian flu is not listed on the webpage. Because of its high mortality rate of about 60% (World Health Organization 2018c), it will nonetheless be included in the analysis. In contrast, the Influenza A (H1N1) virus[4] as well as the Zika virus will be excluded from the analysis, since no reliable data, which is comparable across countries, is available. Furthermore, the Zika virus does not usually end fatally and is therefore expected to have a much smaller effect. For the included outbreaks, epidemics and pandemics count data on the number of deaths is used as a measure, since this data is expected to be more reliable than data on the number of cases.

[3] Intentional homicides are estimates of unlawful homicides purposely inflicted as a results of domestic disputes, interpersonal violence, violent conflicts over land resources, violence between gangs over turf or control and predatory violence and killing by armed groups. Intentional homicide does not include all intentional killing; the difference is usually in the organization of the killing. Individuals or small groups usually commit homicide, whereas killing in armed conflict is usually committed by fairly cohesive groups of up to several hundred members and is thus usually excluded. (United Nations Office On Drugs and Crime 2018)

[4] The Influenza A (H1N1) 2009 pandemic, commonly also known as the swine flu, was a pandemic taking place between 2009 and 2010 and quickly spreading globally. The increasing number of cases made it extremely difficult for many countries to confirm all the cases through laboratory testing, which lead to biases in the number of reported cases. Furthermore, in July 2009, the World Health Organization recommended ending the widespread laboratory testing and stopped keeping track of individual cases (World Health Organization 2009). Therefore, it is assumed that the number of cases reported is inaccurate and severely biased.

SARS: SARS emerged in late 2002 and was recognized by the end of February 2003. The World Health Organization (WHO) issued an emergency travel advisory on March 15, 2003 (World Health Organization 2003b). The disease spread rapidly through several countries, among them China, Hong Kong, Canada, Taiwan, Singapore and Thailand. The SARS outbreak peaked during the second quarter of 2003 and was declared overcome by July 2003. Count data on the number of deaths attributed to SARS per country is drawn from the World Health Organization (World Health Organization 2003a). Based on the argument that health risks have a negative effect on tourism demand, the coefficient of the variable *SARS* is expected to be negative.

Avian flu: Human infections with Avian influenza A(H5N1) were first reported in Hong Kong in 1997. In total, 18 cases, of which 6 ended fatal, were reported in the first known instance of human infection with the virus (World Health Organization 2005). Since 2003 the highly pathogenic H5N1 influenza virus has become endemic in poultry in southeast Asia and constitutes a major pandemic threat to humans (World Health Organization 2018b). Count data on the number of yearly deaths attributed to the avian influenza A(H5N1) per country for the years 2003-2016 is drawn from the World Health Organization (World Health Organization 2018a). Based on the argument that health risks have a negative effect on tourism demand, the coefficient of the variable *Avian flu* is expected to be negative.

Ebola: The West African Ebola virus epidemic (2013-2016) was the largest and most wide-spread outbreak of the Ebola virus disease since the virus was first discovered in 1976. The outbreak started in Guinea and moved across land borders to Sierra Leone as well as Liberia. These countries exhibited widespread and intense transmission. According to the World Health Organization (WHO), the number of total confirmed deaths are 2,544 in Guinea, 4,809 in Liberia[5] and 3,956 in Sierra Leone (World Health Organization 2016). Further, the WHO reports a total of eight deaths in Nigeria (World Health Organization 2014, 2016) and six deaths in Mali (World Health Organization 2016). Outside of Africa, one death is confirmed by the WHO in the US[6] (World Health Organization 2016). Based on the argument that health risks have a negative effect on tourism demand, the coefficient of the variable *Ebola* is expected to be negative.

MERS: The Middle East Respiratory Coronavirus (MERS-CoV) emerged in Saudi Arabia in 2012 and has spread to 26 countries. However, the large majority of cases have occurred in Saudi Arabia. The largest outbreak outside of Saudi Arabia has been reported in South

[5] Due to a lack of arrival data, Liberia is not in my sample of analyzed countries.
[6] Since this person died shortly after returning from Guinea, the US is not considered as directly affected by Ebola.

Korea in 2015 (Chen *et al.* 2017). According to the WHO, since September 2012 787 MERS-CoV associated fatalities have occurred. Count data of the number of deaths caused by MERS per country and year (2012-2016) is drawn from the World Health Organization's Regional Office for the Eastern Mediterranean (World Health Organization 2018d). Based on the argument that health risks have a negative effect on tourism demand, the coefficient of the variable *MERS* is expected to be negative.

2.3.1.3 Controls

As control variables, GDP of the destination country, a measure for openness of the destination country and bilateral exchange rates are used. It should be noted that the inclusion of variables that do not vary over time, such as e.g. cultural or geographical variables, is superfluous, since the model will control for time-invariant factors.

GDP

In order to control for prosperity of the destination country, the country's gross domestic product (GDP) per capita is used as a proxy. The data is drawn from the World Bank for the years 1995-2016 (World Bank 2018a). The variable *GDP* measures the logarithmized GDP per capita based on purchasing power parity (PPP) and in constant 2011 international dollar.[7] A positive relationship between *GDP* and Swiss arrivals is expected.

Openness

As a proxy for a country's connectedness to international markets and its willingness towards international interactions the variable *openness*, measuring the country's openness to international trade is used. The variable *openness* is defined as the sum of exports and imports of goods and services measured as a share of the GDP. The data is taken from the World Bank for the years 1995-2016 (World Bank 2018b). *Openness* is expected to have a positive effect on tourism demand.

Bilateral exchange rate

In order to proxy for the relative price level of tourism in a destination, exchange rates are used. Data on exchange rates is drawn from the Swiss National Bank for the years 1995-2016 (Swiss National Bank 2018). The variable *Bilateral exchange rate* represents annually

[7] PPP GDP is the GDP converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the USD has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Data are in constant 2011 international dollars. (World Bank 2018a)

bilateral exchange rate indices between the Swiss franc and the currency of the destination country. The bilateral exchange rate indices used are real effective exchange rate indices calculated on the basis of the consumer price indices (CPI). The real effective exchange rate index measures the real external value of the Swiss franc, and is the nominal index adjusted for price developments in Switzerland and abroad. It can be used to measure the price competitiveness of an economy. A rise in the index value indicates a real appreciation in the Swiss franc, meaning that Swiss tourists can benefit from relatively lower prices in the destination country. The relationship between arrivals of tourists and price in the destination country is assumed to be negative. Thus, I expect the coefficient of the variable to be positive.

A disadvantage is that the bilateral exchange rate indices are only available for 54 countries. Therefore, this variable will only be used in additional model specifications.

2.3.2 Estimation strategy

This empirical study uses a panel data set of annual data for 144 countries for the period 1995-2016. The inclusion of countries and years is based purely on data availability. The analysis seeks to assess the influence of several risk factors on Swiss arrivals in given countries, taking into account control factors such as GDP, openness and exchange rates. The goal is to estimate the coefficients for β and γ in the following baseline empirical model:

$$Swiss\ Arrivals_{it} = \alpha + \boldsymbol{Risk}'_{it}\beta + \boldsymbol{Controls}'_{it}\gamma + \varepsilon_{it} \qquad (1)$$

The subscripts i and t refer to the country and year considered respectively. $Swiss\ Arrivals_{it}$ is the natural log of the number of Swiss arrivals in country *i* in year *t*. $\boldsymbol{Risk}_{it}$ is a vector containing the variables measuring the risk factors for country *i* in year *t* (see 2.3.1.2 Risk factors). $\boldsymbol{Controls}_{it}$ is a vector containing the control variables for country *i* in year *t* (see 2.3.1.3 Controls). Finally, the error term ε_{it} is defined as $u_i + v_{it}$, where u_i captures country-specific effects that do not change over time and are not included in the explanatory variables, such as e.g. touristic attractions, whereas v_{it} captures disturbances varying between countries and years.

In order to explore the relationship between the dependent variable Swiss Arrivals and the explanatory variables, I apply panel data analysis with country fixed-effects (FE) to control for time-invariant country characteristics such as e.g. geography or touristic attractions. The fixed-effects (FE) estimator subtracts the over-time average of the equation for each country from the equation to be estimated. Because of this within transformation, the individual country effects u_i are cancelled out and the coefficients are estimated based on the time variation within each cross-sectional unit only. Any correlation of the fixed effects with

the explanatory variables is therefore made unproblematic (Neumayer 2004), which mitigates the threat of an omitted variable bias. The regressions with country fixed-effects (FE) will serve as the benchmark results for comparison with further analyses.

It is argued that tourism has a great deal of inertia, meaning that its current value depends on its past values and hence forms an autocorrelation process. Further, studies show that tourists who have already visited a country perceive it as more positive than potential tourists who have not done so (Ingram *et al.* 2013). Therefore, a dynamic model controlling for the effect of past tourism might be more appropriate (Garín-Muñoz & Amaral 2000). If past tourism is not taken into account, the influence of other relevant variables might be overestimated (Garín-Muñoz 2006). Therefore, I add a one-period lagged dependent variable (LDV) of Swiss Arrivals into the model specification (1), which leads to the following model specification:

$$Swiss\ Arrivals_{it} = \alpha + Swiss\ Arrivals_{it-1}\delta + \boldsymbol{Risk'}_{it}\beta + \boldsymbol{Controls'}_{it}\gamma + \varepsilon_{it} \qquad (2)$$

The error term ε_{it} is still defined as $u_i + v_{it}$ and all the variables are defined exactly as in model specification (1) above.

However, because of the inclusion of $Swiss\ Arrivals_{it-1}$, it is problematic to estimate the model specification (2) with a fixed-effects estimator. Although in the process of estimation the u_i are cancelled out, $Swiss\ Arrivals_{it-1}$ will be correlated with v_{it-1}. The correlation of a regressor with the error term violates the strict exogeneity assumption leading commonly used static panel data technique such as fixed-effects estimators to produce biased estimates (Nickell 1981), which is also referred to as the Nickell bias.

Two solutions exist in order to estimate the model specification (2). Anderson and Hsiao (1981) propose as a solution using a two-stage least-squares (2SLS) first-differenced estimator, thus a first-differenced estimator with instrumental variables. The first difference transformation removes both the constant term and the individual effect. There is still correlation between the differenced lagged dependent variable and the disturbance process, but with the individual fixed effects cancelled out, a straightforward instrumental variables (IV) estimator is available. Instruments for the lagged dependent variable can be constructed from the second and third lags of the dependent variable, either in the form of differences or lagged levels. First differencing eliminates u_i and using either $Swiss\ Arrivals_{it-2}$ or $\Delta Swiss\ Arrivals_{it-2}$ (which is equivalent to $Swiss\ Arrivals_{it-2} - Swiss\ Arrivals_{it-3}$) as an instrument solves the problem because neither of these instruments is correlated with $\Delta Swiss\ Arrivals_{it}$.

The other option is to use an Arellano-Bond estimator. Arellano and Bond (1991) argue that while the approach by Anderson and Hsiao (1981) is consistent, it is asymptotically inefficient, as its asymptotic variance is higher than that of their proposed estimator, the reason being that the Anderson-Hsiao estimator does not take into account all the potential orthogonality conditions (Arellano & Bond 1991). The Arellano-Bond estimator (Arellano & Bond 1991) relies on a set of instruments similar to the Anderson-Hsiao estimator (Anderson & Hsiao 1981), but uses generalized method of moments (GMM) estimation rather than instrumental variable estimation. The basic idea of the estimator is to use all prior dependent variables that are valid instruments, and not just $Swiss\ Arrivals_{it-2}$. In this setup, different numbers of instruments are available for each time period: one instrument for t=2, two instruments for t=3 and so on. Moving on to later time periods in each panel's time series, additional orthogonality conditions become available. Taking these additional orthogonality conditions into account improves the efficiency of the Arellano-Bond estimator. The Arellano-Bond estimators are designed to fit linear models with one dynamic dependent variable, additional controls and fixed effects (Roodman 2009), as it is the case in this analysis. The Arellano-Bond Generalized Method of Moments (GMM) estimators involve a first-difference transformation of the model specification (2), which leads to the following form for this particular case:

$$\Delta Swiss\ Arrivals_{it} = \Delta \text{Swiss}\ Arrivals_{it-1}\delta + \Delta \boldsymbol{Risk'}_{it}\beta + \Delta \boldsymbol{Controls'}_{it}\gamma + \Delta\varepsilon_{it} \quad (3)$$

Since $\Delta\varepsilon_{it} = \Delta u_i + \Delta v_{it}$ or $\varepsilon_{it} - \varepsilon_{it-1} = (u_i - u_i) + (v_{it} - v_{it-1}) = \Delta v_{it}$, this leads to:

$$\Delta Swiss\ Arrivals_{it} = \Delta Swiss\ Arrivals_{it-1}\delta + \Delta \boldsymbol{Risk'}_{it}\beta + \Delta \boldsymbol{Controls'}_{it}\gamma + \Delta v_{it} \quad (4)$$

In a next step, the Arellano-Bond method uses later lags of the dependent variable ($\Delta Swiss\ Arrivals_{it-2}$, $\Delta Swiss\ Arrivals_{it-3}$… etc.) as instruments for differenced lags of the dependent variable $\Delta Swiss\ Arrivals_{it-1}$.

Arellano and Bover (1995) and Blundell and Bond (1998) later pointed out that the original Arellano-Bond estimator exhibits the potential weakness that lagged levels are often rather poor instruments for first differenced variables, especially if the variables are close to a random walk. Thus, they modified the estimator by including lagged levels as well as lagged differences. The original estimator is often entitled difference GMM, while the expanded estimator is commonly called system GMM. The system GMM estimator makes the additional assumption that first differences of instruments variables are uncorrelated with the fixed effects, which allows the introduction of more instruments and can improve efficiency (Roodman 2006). However, the GMM estimators and particularly the system GMM

are prone to overfitting endogenous variables. As t rises, the instrument count can grow relatively large in comparison to the sample size, which might make some asymptotic results about the estimators and related specification tests deceptive (Roodman 2006, 2009).[8] Unfortunately, there seems to be no rule on the appropriate number of instruments. Therefore, it is advisable to limit the number of instruments generated and examine the behavior of the coefficient estimates as a robustness test (Roodman 2009).

Finally, as GMM estimators, both the difference GMM and the system GMM estimators have one- and two-step variants. Although asymptotically more efficient, the two-step estimates of the standard errors tend to have a severe downward bias (Arellano & Bond 1991; Blundell & Bond 1998), especially in small samples. Although with the finite-sample correction developed by Windmeijer (2005) this issue can be alleviated to some extent, only one-step estimators will be used in this analysis.

2.4 Results

2.4.1 Descriptive statistics

Table 1 gives an overview over the variables used in the analysis.[9] The dependent variable in the analysis is the logarithmized number of Swiss tourist arrivals in a given year and country. While in some countries, over 3 million of Swiss tourists arrived in a given year (e.g. Germany in 2016), others reported as few as 3 arrivals in a given year (Kiribati in 2008).

Table 1: Summary descriptive statistics

	# of obs.	Mean	SD	Min.	Max.
Swiss Arrivals	2,785	83,938.21	282,344.49	3.00	3,115,456.00
log(Swiss Arrivals)	2,785	9.09	2.16	1.10	14.95
Terror	3,168	89.63	516.87	0.00	17,869.00
Political violence	3,168	165.49	1208.36	0.00	48,666.00
Crime	1,950	8.25	13.46	0.00	139.13
SARS	3,168	0.15	6.31	0.00	349.00
Avian flu	3,168	0.14	1.63	0.00	45.00
MERS	3,168	0.21	6.25	0.00	273.00
Ebola	3,168	2.06	63.15	0.00	2,758.00
GDP	3,025	16,812.72	17,642.08	574.84	97,864.20
log(GDP)	3,025	9.17	1.15	6.35	11.49
Openness	2,969	86.43	48.95	0.17	441.60
Bilateral exchange rate	970	105.87	21.14	52.00	208.94

Source: Own table

[8] Roodman (2009) provides a detailed review of these issues.
[9] A correlation matrix for all independent variables can be found in Appendix I: Data and descriptive statistics.

Regarding the risk variables, relatively large differences can be observed as well. While some countries were spared from risk factors altogether, others were affected by several thousand cases in a given year. As an example, in the year 2001, the US reported 17,869 terror victims (including injured persons) due to the 9/11 attacks. Another example is Ethiopia, which exhibited 48,666 fatalities in the year 2000 as a consequence of the Eritrean-Ethiopian War.

As can be observed by the summary descriptive statistics for the control variables, the panel includes a sample of countries in different stages of economic development, ranging from a GDP per capita (in international dollars and PPP adjusted) of 574.84 (Ethiopia in 1995) up to 97,864.20 (Luxembourg in 2007). According to the variable openness, which measures the countries connectedness to international markets, the least open country in the sample was Myanmar in 2009, while the most open country was Singapore in 2008. Finally, bilateral exchange rates between Switzerland and the destination countries are used as a proxy for changes in costs. However, as can be seen by the relatively low number of observations, data is missing or incomplete for a large number of countries.

2.4.2 Empirical results of the main analysis

2.4.2.1 Fixed-effects estimations

All countries

Table 2 presents country fixed-effects estimations for the complete sample. Columns (1) to (4) report the results of the regressions when including each of the four risk factors in isolation. The terror variable is not statistically significant, while the political violence variable as well as the crime variable are statistically significant at the 1% level, with the expected negative sign. Regarding the health risks, SARS and MERS are statistically significant, however, only at the 10% level. When all risk factor variables are combined (see column 5), again, political violence and crime have a statistically significant negative effect on Swiss arrivals at the 1% level. SARS has a statistically significant negative effect at the 5% level. The coefficient suggests that if the number of SARS deaths increases by 1, on average, Swiss tourist arrivals will decrease by approximately 0.29%. Since further variables are likely to influence the arrivals of Swiss tourists, in column (6) the control variables GDP and openness are added. Again, political violence is highly significant. The coefficient implies that if there is one additional fatality because of political violence, on average, Swiss tourist arrivals will approximately decrease by 0.00661%. Crime remains significant, however, only at the 10% level. The coefficient suggests that if the number of intentional homicides per 100,000 people increases by 1, Swiss tourist arrivals will, on average, decrease by approximately 0.336%. In contrast, SARS becomes statistically insignificant.

GDP and openness are both significant at the 1% level with the expected positive signs. Thus, Swiss tourists travel on average more often to countries with a higher economic performance and countries that are well connected to international markets. An increase of the GDP by 1% increases Swiss tourist arrivals on average by 1.296%. If openness, which is measured as the sum of exports and imports as a share of GDP, increases by 1, Swiss tourist arrivals will on average increase by approximately 0.164%.
Finally, in column (7) the additional control variable bilateral exchange rate is included. However, since bilateral exchange rates are only available for around one third of the analyzed countries, including this control variable reduces the sample size considerably and potentially biases the results. However, surprisingly, the results remain relatively stable and the bilateral exchange rate is statistically significant at the 1% level, with the expected positive sign. The coefficient implies that if the bilateral exchange rate index increases by 1, then Swiss tourist arrivals will on average increase by approximately 0.455%.

Since Swiss tourists might react differently to risk factors depending on the region of their destination, I repeat the analysis by dividing the countries of the original panel into five subsets consisting of the regions Africa, Americas, Asia-Pacific, Europe and Middle East.

Africa

Table 3 repeats the analysis for the region Africa. Regarding the health risks, only Ebola is included in the analysis, since the others did not affect the region. Further, the bilateral exchange rate is omitted in this analysis, since it is only available for one country.
When including the terror variable in isolation, it is statistically significant, however, contrary to the expectation, with a positive sign. However, after controlling for further variables, it becomes insignificant. Thus, none of the risk factors seems to have an influence on Swiss tourist arrivals. The control variables GDP and openness are both statistically significant with the expected positive sign. Consequently, on average, the higher the economic performance of a country in the region of Africa and the better its connection to international markets, the higher the number of Swiss tourist arrivals.

Americas

The results for the region Americas are reported in Table 4. Since none of the analyzed health risk concerned the region, they are excluded from the model specifications. The results show that none of the risk factor variables is statistically significant. In contrast, GDP, openness and the bilateral exchange rate are all statistically significant, with the expected positive signs.

Asia-Pacific

The results of the fixed-effects estimations for the region Asia-Pacific are reported in Table 5. Regarding the health risks only SARS and avian flu are included in the analysis, since the region was not affected by MERS and Ebola. The results are stable with the risk factors political violence, crime and SARS having a statistically significant negative effect on Swiss tourist arrivals in the Asia-Pacific region. Regarding the control variables, GDP has a positive effect on Swiss tourist arrivals in the region. The effect is statistically significant at the 1% level.

Adding the control variable bilateral exchange rate (column 7) renders the coefficients of political violence and crime insignificant, while the coefficient of bilateral exchange rate itself is highly statistically significant with the expected positive sign. Further, openness has a negative effect on Swiss arrivals. However, it should be noted that controlling for the bilateral exchange rate reduces the sample to only 9 countries, which biases the results.

Europe

The results for the region Europe are presented in Table 6. Regarding the health risks, only MERS is included in the analysis, since the others did not affect the region. Both political violence and crime have a statistically significant negative effect on Swiss tourist arrivals in Europe. The coefficients of crime are in all model specifications significant at the 1% level. Regarding the control variables, the results in column (6) show that a higher GDP has on average a positive effect on Swiss tourist arrivals in Europe. The effect is significant at the 1% level as well. Column (7) reports the results when additionally controlling for the bilateral exchange rate. In this model specification, political violence becomes statistically insignificant, while the variables GDP and crime remain statistically significant at the 1% level. Openness and the bilateral exchange rate are also statistically significant at the 1% level with the expected positive signs. It should be noted that the sample of included countries is reduced to 30 when adding this additional control.

Middle East

Table 7 reports the result for the region Middle East. Since the region was only affected by avian flu and MERS, SARS and Ebola are not included in the analysis. When including the risk factors in isolation, terror, political violence and crime are statistically significant at the 1% level. However, when combining the risk factor variables, of these three variables, only crime remains statistically significant. Furthermore, rather surprisingly, avian flu seems to have a positive effect. When adding the control variables GDP and openness, only crime remains statistically significant at the 1% level with the expected negative sign. Further,

GDP has a statistically significant positive effect on Swiss tourist arrivals in the Middle East at the 1% level.
When adding the control variable bilateral exchange rate, terror becomes statistically significant at the 5% level with a negative sign, while crime becomes insignificant. GDP remains highly statistically significant. However, it should be noted that for this model specification the sample size is reduced to only five countries.

Finally, since tourists might need some time to adapt to changes in risk factors, as a robustness test the analysis is repeated with all the independent variables lagged by one period. Overall, the results are in line with the results presented so far and no major differences between the contemporaneous effects of the independent variable and their lagged effects are observable. Some slight differences exist, however, only on the regional level. For the region of Africa, the lagged variable of crime is significant, indicating that Swiss tourists need a certain amount of time to react to changes in crime. Furthermore, for the region Asia-Pacific, the lagged effect of SARS is not significant, indicating that SARS has only an immediate effect on Swiss tourist arrivals. Finally, for the region Middle East, contrary to the expectation, the lagged variable of MERS seems to have a small, but positive effect on Swiss tourist arrivals.

Table 2: Fixed-effects estimations for all countries

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Terror	-0.00000142				0.0000243	0.0000140	-0.00000367
	(0.942)				(0.255)	(0.418)	(0.791)
Political violence		-0.0000363***			-0.0000994***	-0.0000661***	0.0000235
		(0.000)			(0.000)	(0.002)	(0.599)
Crime			-0.0101***		-0.00980***	-0.00336*	-0.0145**
			(0.000)		(0.000)	(0.074)	(0.017)
SARS				-0.00244*	-0.00290**	-0.000983	-0.00114*
				(0.091)	(0.015)	(0.311)	(0.089)
Avian flu				0.00338	0.00351	-0.00369	0.00511
				(0.596)	(0.726)	(0.650)	(0.614)
MERS				0.00268*	0.00234	0.00228	0.00139
				(0.089)	(0.731)	(0.679)	(0.712)
Ebola				-0.0000263	-0.000190	-0.0000502	0.115
				(0.870)	(0.575)	(0.874)	(0.616)
log(GDP)						1.296***	1.222***
						(0.000)	(0.000)
Openness						0.00164***	0.00294***
						(0.004)	(0.000)
Bilateral exchange rate							0.00455***
							(0.000)
Number of observations	2,785	2,785	1,768	2,785	1,768	1,710	777
Countries	144	144	140	144	140	136	51
R^2	0.0000	0.0071	0.0119	0.0023	0.0244	0.3726	0.4326
F-test	0.0053	18.8535	19.6308	1.5165	5.8036	103.2492	54.5887
p value of F-test	0.9421	0.0000	0.0000	0.1946	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 3: Fixed-effects estimations for Africa

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals
Terror	0.000201***				0.000266	-0.0000803
	(0.000)				(0.289)	(0.749)
Political violence		-0.0000156			-0.0000880	0.000238
		(0.193)			(0.699)	(0.300)
Crime			-0.0119		-0.0124	0.00406
			(0.203)		(0.180)	(0.674)
Ebola				-0.0000263	-0.000193	-0.0000000295
				(0.904)	(0.628)	(1.000)
log(GDP)						1.260***
						(0.001)
Open						0.00796**
						(0.044)
Number of observations	476	476	151	476	151	147
Countries	28	28	26	28	26	26
R^2	0.0339	0.0038	0.0130	0.0000	0.0621	0.1666
F-test	15.6716	1.7011	1.6356	0.0147	2.0025	3.8328
p value of F-test	0.0001	0.1928	0.2033	0.9035	0.0984	0.0016

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 4: Fixed-effects estimations for the Americas

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals
Terror	-0.00000966			-0.00000457	-0.00000237	0.00000780
	(0.636)			(0.843)	(0.908)	(0.551)
Political violence		-0.0000535		-0.0000202	-0.0000138	-0.0000398
		(0.521)		(0.832)	(0.871)	(0.511)
Crime			0.000981	0.00102	0.000666	-0.00220
			(0.577)	(0.565)	(0.678)	(0.817)
log(GDP)					1.001***	0.663***
					(0.000)	(0.000)
Openness					0.00452***	0.00676**
					(0.001)	(0.033)
Bilateral exchange rate						0.00361***
						(0.006)
Number of observations	584	584	419	419	403	89
Countries	30	30	29	29	28	6
R^2	0.0004	0.0007	0.0008	0.0015	0.2175	0.3842
F-test	0.2247	0.4118	0.3117	0.1935	20.5686	8.0053
p value of F-test	0.6357	0.5213	0.5770	0.9008	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 5: Fixed-effects estimations for Asia-Pacific

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Terror	-0.0000927				0.0000166	-0.00000775	-0.00000715
	(0.101)				(0.724)	(0.851)	(0.713)
Political violence		-0.000164***			-0.000106***	-0.0000935***	0.0000340
		(0.000)			(0.000)	(0.000)	(0.373)
Crime			-0.135***		-0.125***	-0.0711***	-0.0142
			(0.000)		(0.000)	(0.000)	(0.399)
SARS				-0.00240*	-0.00265***	-0.00149*	-0.00118***
				(0.078)	(0.009)	(0.095)	(0.003)
Avian flu				0.00250	0.000990	-0.00170	0.00195
				(0.722)	(0.915)	(0.835)	(0.825)
log(GDP)						0.834***	1.131***
						(0.000)	(0.000)
Openness						-0.000314	-0.00339***
						(0.771)	(0.000)
Bilateral exchange rate							0.00288***
							(0.010)
Number of observations	557	557	326	557	326	326	132
Countries	29	29	28	29	28	28	9
R^2	0.0051	0.0538	0.2734	0.0061	0.3292	0.4871	0.7649
F-test	2.7064	29.9522	111.7639	1.6243	28.7604	39.4815	46.7669
p value of F-test	0.1005	0.0000	0.0000	0.1980	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 6: Fixed-effects estimations for Europe

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Terror	0.0000162				0.0000733	0.0000307	-0.0000388
	(0.882)				(0.678)	(0.837)	(0.775)
Political violence		-0.0000673			-0.000803**	-0.000969***	0.0000835
		(0.248)			(0.019)	(0.001)	(0.906)
Crime			-0.189***		-0.186***	-0.0567***	-0.0799***
			(0.000)		(0.000)	(0.000)	(0.000)
MERS				0.190	0.144	0.119	0.0388
				(0.158)	(0.206)	(0.215)	(0.576)
log(GDP)						1.309***	1.168***
						(0.000)	(0.000)
Openness						0.00124	0.00356***
						(0.113)	(0.000)
Bilateral exchange rate							0.00828***
							(0.000)
Number of observations	903	903	749	903	749	715	497
Countries	44	44	44	44	44	41	30
R^2	0.0000	0.0016	0.2576	0.0023	0.2651	0.5036	0.4718
F-test	0.0219	1.3385	244.2690	1.9968	63.2113	112.9385	58.6880
p value of F-test	0.8823	0.2476	0.0000	0.1580	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 7: Fixed-effects estimations for Middle East

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Terror	-0.000290***				-0.000164	-0.0000989	-0.000262**
	(0.000)				(0.134)	(0.362)	(0.026)
Political violence		-0.000392***			-0.0000747	-0.000126	-0.000137
		(0.000)			(0.450)	(0.199)	(0.211)
Crime			-0.233***		-0.194***	-0.172***	-0.0632
			(0.000)		(0.001)	(0.003)	(0.363)
Avian flu				0.00667	0.0324**	0.0204	-0.0147
				(0.593)	(0.050)	(0.219)	(0.298)
MERS				0.00256	-0.000524	-0.0000697	0.000908
				(0.121)	(0.902)	(0.987)	(0.763)
log(GDP)						0.813***	1.641***
						(0.006)	(0.001)
Openness						0.00104	-0.00433
						(0.720)	(0.257)
Bilateral exchange rate							-0.00309
							(0.217)
Number of observations	265	265	123	265	123	119	42
Countries	13	13	13	13	13	13	5
R^2	0.1117	0.2092	0.2113	0.0107	0.2933	0.3627	0.6691
F-test	31.5512	66.4037	29.1973	1.3563	8.7136	8.0499	7.3307
p value of F-test	0.0000	0.0000	0.0000	0.2595	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

2.4.2.2 Dynamic GMM estimations

Since current Swiss tourist arrivals are likely to be determined to a large extent by past Swiss tourist arrivals, and as a robustness test, the analysis is repeated conducting dynamic Arellano-Bond difference GMM regressions allowing for the inclusion of the lagged dependent variable.[10] As an additional robustness test, the analysis is also executed with Arellano-Bover/Blundell-Bond system estimator regressions.[11]

All countries

Table 8 presents the empirical results of the Arellano-Bond difference GMM estimates, employing the complete panel data set. As expected, the lagged dependent variable is highly significant in all model specifications and exhibits very high positive coefficients. Thus, present Swiss tourist arrivals are on average to a large extent explained by past Swiss tourist arrivals. Even after controlling for the lagged dependent variable, the results are very similar to the ones of the fixed-effects regression analysis. Again, crime and SARS have both a statistically significant effect on Swiss tourist arrivals with the expected negative sign. Regarding the control variables, Swiss arrivals increase with GDP, openness and a favorable bilateral exchange rate. As in the fixed-effects regression analysis, all the coefficients of the control variables are statistically significant at the 1% level. The most important difference between the Arellano-Bond estimations and the benchmark fixed-effects estimations lies in the political violence variable. While in the fixed-effects estimations political violence is highly significant with a negative sign, it is not significant anymore in the model specifications in Table 8. Another noteworthy difference is the positive coefficient for Ebola in model specification (4), which is counterintuitive. However, when controlling for variables other than health risks, this coefficient becomes insignificant. Additionally, in the broad model specification including the bilateral exchange rate (7), MERS is statistically significant with the expected negative sign.

[10] In this analysis, the number of instruments is unrestricted. Different restrictions regarding the number of instruments have been tested as an additional robustness test. The results proved to be consistent.

[11] The results of the Arellano-Bover/Blundell-Bond system estimator regressions are in line with the results presented in the following and are reported in Appendix II: Additional regression results.

Africa

Table 9 repeats the analysis for the region Africa. Again, as expected, the lagged dependent variable is statistically significant with positive coefficients. Note that while still relatively high, the coefficients of the lagged dependent variable are considerably lower than in the analysis which includes the full set of countries. This implies that, while present Swiss tourist arrivals in Africa depend on past Swiss tourist arrivals, the relation is not as strong as for the average destination.
Somewhat surprisingly, in model specification (5), the Ebola coefficient is statistically significant with a positive sign. However, the coefficient becomes insignificant, when adding control variables, and should therefore not be over-emphasized. As in the fixed-effects regression analysis, GDP is statistically significant at the 1% level with the expected positive sign. In contrast, openness is no longer statistically significant.

Americas

The Arellano-Bond estimation results for the region Americas are reported in Table 10. In all model specifications the lagged dependent variable is highly statistically significant with the expected positive sign. Hence, current Swiss tourist arrivals in the Americas can at least partly be explained by past Swiss tourist arrivals in this region.
Exactly as in the fixed-effects regression analysis, none of the risk factors is statistically significant. Again, Swiss tourist arrivals increase with GDP, openness and a favorable exchange rate.

Asia-Pacific

Table 11 reports the results for the region Asia-Pacific. In all model specifications, the lagged dependent variable is highly significant with the expected positive sign. The results are in line with the ones of the fixed-effects regression analysis. Again, the risk factors political violence, crime and SARS have a statistically significant negative effect on Swiss tourist arrivals in the region. Regarding the control variables, GDP has again a positive effect on Swiss tourist arrivals at the 1% level. The bilateral exchange rate exhibits a statistically significant positive coefficient as well.
The only noteworthy difference is that in model specification (6) openness is statistically significant with a positive sign, while this is not the case in the fixed-effects regression analysis. However, the effect is only statistically significant at the 10% level. In contrast, while in model specification (7) of the fixed-effects regression analysis openness

showed a statistically significant negative effect, the coefficient is now insignificant. Again, it should be taken into account that model specification (7) only includes a sample of nine countries, which might distort the results.

Europe

Table 12 presents the results for the region Europe. The lagged dependent variable is highly significant in all model specifications and exhibits very high positive coefficients. Thus, in Europe, present Swiss tourist arrivals are on average to a large extent explained by past Swiss tourist arrivals.
As in the fixed-effects regression analysis, crime has a negative effect on Swiss tourist arrivals. The most important difference between the Arellano-Bond estimations and the benchmark fixed-effects estimations lies in the political violence variable. After controlling for past Swiss tourist arrivals, this variable is only significant in model specification (2), not however in model specifications, which include other risk factors or further control variables. Regarding the control variables, column (6) indicates that openness has on average a positive effect on Swiss tourist arrivals. However, the coefficient is only significant at the 10% level. When additionally controlling for the bilateral exchange rate (7), the coefficient of openness becomes insignificant, while GDP and the bilateral exchange rate are statistically significant.

Middle East

The results for the region Middle East are reported in Table 13. The lagged dependent variable is highly significant in all model specifications and exhibits positive coefficients. The results are very similar to the ones of the fixed-effects regression analysis. As in the fixed-effects regression analysis, when including the risk factors in isolation, terror, political violence and crime are statistically significant at the 1% level. As before, when combining the risk factor variables (5) as well as when adding the control variables GDP and openness (6), of these three variables, only crime remains statistically significant. In contrast to the fixed-effects regression analysis, additionally, MERS has a statistically significant negative effect in model specification (4) and (5), however, only at the 10% level. Regarding the control variables, as before, GDP has a positive effect on Swiss tourist arrivals. Also, as in the fixed-effects regression analysis, when adding the control variable bilateral exchange rate (7), terror becomes statistically significant with a negative sign, while crime becomes insignificant. Again, it should be noted that this model specification only includes five countries.

Table 8: Arellano-Bond difference GMM estimations (one-step) for all countries

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Lagged Swiss Arrivals	0.932***	0.931***	0.874***	0.931***	0.871***	0.672***	0.833***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Terror	-0.0000168				-0.00000595	-0.00000506	-0.00000295
	(0.354)				(0.703)	(0.722)	(0.767)
Political violence		0.00000414			-0.0000176	-0.0000199	-0.0000421
		(0.558)			(0.440)	(0.338)	(0.224)
Crime			-0.00950***		-0.00935***	-0.00860***	-0.00578
			(0.000)		(0.000)	(0.000)	(0.329)
SARS				-0.00186*	-0.00189**	-0.00163**	-0.00170***
				(0.072)	(0.015)	(0.023)	(0.000)
Avian flu				0.00162	-0.000872	-0.00333	-0.00632
				(0.781)	(0.909)	(0.635)	(0.393)
MERS				-0.00113	-0.00589	-0.00436	-0.00612***
				(0.433)	(0.122)	(0.213)	(0.003)
Ebola				0.000259**	0.0459	0.0299	0.0658
				(0.022)	(0.868)	(0.905)	(0.649)
log(GDP)						0.438***	0.207***
						(0.000)	(0.008)
Open						0.00246***	0.00164***
						(0.002)	(0.010)
Bilateral exchange rate							0.00210***
							(0.001)
Number of observations	2,444	2,444	1,483	2,444	1,483	1,434	701
Countries	144	144	125	144	125	121	51
Wald chi-square test	1131.4751	1131.3853	527.1098	1134.1392	544.1627	728.7119	2014.2180
p value of Wald test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 9: Arellano-Bond difference GMM estimations (one-step) for Africa

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals
Lagged Swiss Arrivals	0.520***	0.527***	0.500***	0.531***	0.483***	0.291**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.012)
Terror	0.000129				0.000226	-0.0000645
	(0.157)				(0.707)	(0.909)
Political violence		0.00000783			-0.000100	0.000131
		(0.418)			(0.522)	(0.418)
Crime			-0.00514		-0.00602	0.00645
			(0.403)		(0.353)	(0.365)
Ebola				-0.00000908	0.308***	-0.632
				(0.949)	(0.000)	(0.100)
log(GDP)						1.357***
						(0.002)
Open						0.00115
						(0.715)
Number of observations	400	400	92	400	92	91
Countries	28	28	15	28	15	15
Wald chi-square test	123.8350	121.4497	25.3191	122.0074	128797.2989	148448.5143
p value of Wald test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 10: Arellano-Bond difference GMM estimations (one-step) for the Americas

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals
Lagged Swiss Arrivals	0.788***	0.786***	0.630***	0.628***	0.534***	0.833***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Terror	-0.0000119			-0.00000444	-0.00000535	-0.00000784
	(0.263)			(0.764)	(0.704)	(0.279)
Political violence		-0.0000535		-0.0000393	-0.0000182	-0.0000198
		(0.222)		(0.525)	(0.758)	(0.565)
Crime			-0.0000199	0.0000458	-0.00134	-0.00125
			(0.990)	(0.977)	(0.390)	(0.802)
log(GDP)					0.519***	0.145*
					(0.000)	(0.086)
Open					0.00482***	0.000128
					(0.000)	(0.940)
Bilateral exchange rate						0.00132*
						(0.068)
Number of observations	513	513	361	361	345	79
Countries	30	30	28	28	27	6
Wald chi-square test	491.2404	492.3613	178.2459	178.4781	244.1231	378.4831
p value of Wald test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 11: Arellano-Bond difference GMM estimations (one-step) for Asia-Pacific

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Lagged Swiss Arrivals	0.817***	0.801***	0.591***	0.816***	0.553***	0.267***	0.624***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Terror	-0.000111*				0.0000243	-0.0000223	0.0000309
	(0.088)				(0.712)	(0.697)	(0.395)
Political violence		-0.0000382*			-0.0000413**	-0.0000504***	-0.0000457
		(0.056)			(0.023)	(0.002)	(0.140)
Crime			-0.0653***		-0.0636***	-0.0454***	-0.00774
			(0.000)		(0.000)	(0.000)	(0.533)
SARS				-0.00180**	-0.00182***	-0.00122**	-0.00134***
				(0.040)	(0.008)	(0.041)	(0.000)
Avian flu				-0.00133	-0.000423	-0.00241	0.00183
				(0.780)	(0.948)	(0.670)	(0.779)
log(GDP)						0.829***	0.362***
						(0.000)	(0.001)
Open						0.00177*	-0.000647
						(0.092)	(0.366)
Bilateral exchange rate							0.00157*
							(0.077)
Number of observations	488	488	271	488	271	271	121
Countries	29	29	26	29	26	26	9
Wald chi-square test	403.6422	411.8824	231.4795	411.0694	254.6472	411.8034	741.6022
p value of Wald test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 12: Arellano-Bond difference GMM estimations (one-step) for Europe

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Lagged Swiss Arrivals	0.936***	0.935***	0.834***	0.936***	0.832***	0.764***	0.825***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Terror	-0.0000548				0.0000399	0.0000231	0.0000486
	(0.432)				(0.744)	(0.849)	(0.574)
Political violence		-0.0000624*			-0.000336	-0.000394	-0.000495
		(0.085)			(0.371)	(0.290)	(0.248)
Crime			-0.0436***		-0.0433***	-0.0308*	-0.0123
			(0.002)		(0.002)	(0.071)	(0.326)
MERS				0.00942	0.00842	0.00704	-0.0245
				(0.901)	(0.909)	(0.923)	(0.554)
log(GDP)						0.118	0.243**
						(0.332)	(0.049)
Open						0.00196*	0.00118
						(0.052)	(0.122)
Bilateral exchange rate							0.00378***
							(0.000)
Number of observations	809	809	655	809	655	627	449
Countries	44	44	44	44	44	41	30
Wald chi-square test	1313.5752	1318.7053	714.0505	1312.4191	711.9378	754.2777	1521.7091
p value of Wald test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 13: Arellano-Bond difference GMM estimations (one-step) for Middle East

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Lagged Swiss Arrivals	0.733***	0.709***	0.610***	0.772***	0.600***	0.553***	0.476***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Terror	-0.000149***				-0.000105	-0.0000859	-0.000235***
	(0.001)				(0.151)	(0.243)	(0.007)
Political violence		-0.000180***			0.00000885	-0.0000278	-0.000104
		(0.004)			(0.902)	(0.699)	(0.245)
Crime			-0.132***		-0.107***	-0.0730*	-0.0237
			(0.000)		(0.008)	(0.085)	(0.678)
Avian flu				-0.00292	0.00329	-0.00244	-0.0129
				(0.697)	(0.771)	(0.831)	(0.233)
MERS				-0.00166*	-0.00483*	-0.00436	-0.00394
				(0.091)	(0.093)	(0.128)	(0.139)
log(GDP)						0.397*	0.790*
						(0.081)	(0.050)
Open						0.00355	0.00170
						(0.126)	(0.623)
Bilateral exchange rate							-0.000311
							(0.879)
Number of observations	234	234	104	234	104	100	36
Countries	13	13	12	13	12	12	5
Wald chi-square test	215.2333	210.4054	162.4673	200.3465	165.8306	176.9751	96.5811
p value of Wald test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

2.4.3 The influence of media coverage

Since it is argued that media coverage might considerably influence tourism demand via tourists' risk perception, the fixed-effects analysis is repeated using data on the yearly number of Swiss newspaper reports regarding a risk factor for a country, rather than data on actual cases. The data is drawn from Factiva, a research and media pool owned by Dow Jones & Company. In order to achieve full coverage for all the newspapers and years under consideration, the analysis is restricted to three major daily Swiss newspapers[12] and to the period 2000-2016[13], since for this specification Factiva provides full coverage. For each country in the sample, the newspapers are scanned[14] using specific search terms[15] for each risk factor.

All countries

Table 14 presents country fixed-effects estimations for the complete sample using data on media coverage. Columns (1) to (4) report the regression results when including each of the four risk factors in isolation. Political violence has a statistically significant negative effect, however, only at the 10% level. Regarding the health risks, SARS is statistically significant at the 1% level and Avian flu at the 10% level, with the expected negative signs.

When all risk factor variables are combined (see column 5), only SARS and Avian flu remain statistically significant at the 1% level and the 10% level, respectively. The coefficient of the variable Avian flu suggests that if the number of articles in the analyzed newspapers about Avian flu in a given country increases by 1, on average, Swiss tourist arrivals will decrease by approximately 0.79% in that country.

Since further variables are likely to influence the arrivals of Swiss tourists, again, in column (6) the control variables GDP and openness are added. Political violence has now again a negative effect at the 10% significance level. Furthermore, surprisingly, Ebola now seems to have a positive impact on Swiss tourist arrivals. However, it should be taken into account that Ebola was widely discussed in the Swiss media for a few

[12] Tages-Anzeiger (German language), Neue Zürcher Zeitung (German language) and le Temps (French language).

[13] In order to ensure comparability with the main analysis, which covers the period 1995-2016, as well as an additional robustness test, the main analysis is repeated for the period 2000-2016. The results are very stable and the conclusion remain the same. Thus, analyzing a more limited time period should not influence the results.

[14] The scan is restricted to the headline and the first paragraph of each article, so that only newspaper articles focusing on relevant information should be selected.

[15] The specific search terms can be found in Appendix I: Data and descriptive statistics.

isolated cases in Western countries, when in fact the large majority of cases occurred in countries of Western Africa.[16] GDP and openness are both statistically significant at the 1% level with the expected positive signs. After controlling for media reports about risk factors, Swiss tourists travel, thus, on average more often to countries with a higher economic performance and countries that are well connected to international markets. An increase of the GDP by 1% increases Swiss tourist arrivals on average by 1.310%. If openness, which is measured as the sum of exports and imports as a share of GDP, increases by 1, Swiss tourist arrivals will on average increase by approximately 0.398%. Finally, in column (7) the additional control variable bilateral exchange rate is included. Again, since bilateral exchange rates are only available for around one third of the analyzed countries, including this control variable reduces the sample size considerably and potentially biases the results. In this model specification, SARS is the only risk factor with a statistically significant effect, however, only at the 10% level, with the expected negative sign. GDP, openness and the bilateral exchange rate are all statistically significant at the 1% level with the expected positive signs. The coefficient of the bilateral exchange rate variable implies that if the bilateral exchange rate index increases by 1, then, Swiss tourist arrivals will on average increase by approximately 0.528%.
While the results regarding the control variables are very similar to those of the benchmark fixed-effects analysis, which uses data on actual incidents, regarding both size and significance, there are some difference regarding the effects of the risk factors. In contrast to the benchmark analysis, the effect of political violence is now less pronounced, while no effect at all can be found for crime.

Since Swiss tourists might react differently to media reports about risk factors depending on the region of their destination, again, I repeat the analysis by dividing the countries of the original panel into five subsets consisting of the regions Africa, Americas, Asia-Pacific, Europe and Middle East. In order to ensure comparability of results, for each region the same variables as in the main analysis are included, even though a country might be mentioned in a newspaper article for an additional risk factor.

Africa

Table 15 reports the results for the region Africa. As in the benchmark analysis with data on real cases, and again contrary to the intuition, media reports on terror seem to have

[16] As the regional analysis shows, Ebola is not statistically significant for Africa.

a positive effect on Swiss tourist arrivals in African countries. Additionally, when combining the risk factors (column 5), political violence has a statistically significant negative effect, however, only at the 10% level. When controlling for GDP and openness, as in the benchmark analysis, none of the risk factors remains statistically significant. GDP has a statistically significant positive effect at the 1% level.

Americas

The results for the region Americas are presented in Table 16. In isolation, media reports about terror have a negative effect on Swiss tourist arrivals at the 10% significance level, however, the effect becomes statistically insignificant, when controlling for further variables. A noteworthy difference to the benchmark analysis which uses data on real incidents, lies in the variable political violence, which now has a statistically significant negative effect. The effect remains statistically significant, even when controlling for further variables.[17] The control variables GDP and openness are both statistically significant, with the expected positive sign. When additionally controlling for the bilateral exchange rate, contrary to the intuition, crime has a positive effect on Swiss tourist arrivals. However, the effect is only statistically significant at the 10% level. Furthermore, it should again be taken into account that model specification (6) only includes a sample of six countries, which might distort the results. The bilateral exchange rate is statistically significant as well, with the expected positive sign.

Asia-Pacific

The results for the region Asia-Pacific are presented in Table 17. As in the benchmark analysis, which uses data on real incidents, political violence and SARS have a statistically significant effect on Swiss tourist arrivals in the region. The negative effect of political violence is, however, somewhat less distinct, as it is only significant in model specification 6. In contrast to the benchmark analysis, crime has no significant effect on Swiss tourist arrivals in the Asia-Pacific region. Regarding the control variables, GDP has again a positive effect on Swiss tourist arrivals in the region. The effect is statistically

[17] A multitude of newspaper articles mentions the US in connection with the Iraq War. It might be argued that the Iraq War did not present an immediate risk to potential tourists travelling to the US. Thus, the large number of these articles might bias the results. Therefore, additionally, the analysis is executed without articles mentioning the Iraq War. Interestingly, when omitting these articles, the variable political instability becomes statistically insignificant. It seems that the Iraq War indeed deterred Swiss tourists from travelling to the US, potentially not because of an immediate risk, but because of a change in perception of the US as a peaceful destination. The remaining results do not change.

significant at the 1% level. Adding the control variable bilateral exchange rate (column 7) renders the coefficients of political violence insignificant, while the coefficient of bilateral exchange rate itself is highly statistically significant with the expected positive sign. Further, and again as in the benchmark analysis, openness has a negative effect on Swiss arrivals, at the 1% significance level. However, it should be noted that controlling for the bilateral exchange rate reduces the sample to only 9 countries, which is likely to bias the results.

Europe

Table 18 presents the estimation results for the region Europe. None of the risk factors has a statistically significant effect. This is in contrast to the benchmark specification, in which both political violence and crime have a statistically significant negative impact. Regarding the control variables, GDP, openness and the bilateral exchange rate are all statistically significant at the 1% significance level, with the expected positive signs.

Middle East

Table 19 repeats the analysis for the region Middle East. Terror has a statistically significant negative effect on Swiss tourist arrivals. Being statistically significant in all model specifications, the effect is even more pronounced than in the benchmark analysis. Similar to the benchmark analysis, political violence is only significant when analyzed in isolation.
When adding the control variables GDP and openness, additionally and similar to the benchmark analysis, crime becomes statistically significant, however, only at the 10% significance level. GDP and openness are both statistically significant at the 1% level with the expected positive sign. When adding the additional control variable bilateral exchange rate, crime becomes statistically insignificant. Terror, GDP and openness remain statistically significant, while the bilateral exchange rate itself has no significant effect. Again, it should be noted that for this model specification the sample size is reduced to only five countries.

Overall, while the main results are comparable to the benchmark analysis, which uses data on real incidents, in most cases, fewer significant effects are observable or the effects are weaker. An exception is the risk factor terror for the region Middle East, for which the effect of media reports on Swiss tourist arrivals is stronger than the effect of actual cases on Swiss tourist arrivals.

Table 14: Fixed-effects estimations for all countries (media analysis)

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Terror	-0.000498				-0.000308	-0.000381	-0.000432
	(0.301)				(0.541)	(0.366)	(0.127)
Political violence		-0.000859*			-0.000672	-0.000735*	-0.000384
		(0.057)			(0.154)	(0.063)	(0.165)
Crime			-0.00208		-0.00210	-0.00560	0.00231
			(0.656)		(0.655)	(0.157)	(0.438)
SARS				-0.00841***	-0.00808***	-0.00214	-0.00313*
				(0.004)	(0.006)	(0.392)	(0.062)
Avian flu				-0.00762*	-0.00791*	-0.00438	-0.00304
				(0.099)	(0.087)	(0.259)	(0.267)
MERS				0.0466	0.0461	0.0209	0.0202
				(0.159)	(0.164)	(0.451)	(0.270)
Ebola				0.00431	0.00435	0.00693**	0.00320
				(0.248)	(0.244)	(0.037)	(0.167)
log(GDP)						1.310***	1.263***
						(0.000)	(0.000)
Open						0.00398***	0.00341***
						(0.000)	(0.000)
Bilateral exchange rate							0.00528***
							(0.000)
Number of observations	2,225	2,225	2,225	2,225	2,225	2,078	842
Countries	144	144	144	144	144	137	51
R^2	0.0005	0.0017	0.0001	0.0068	0.0085	0.3024	0.4628
F-test	1.0714	3.6334	0.1982	3.5659	2.5388	93.0407	67.2836
p value of F-test	0.3007	0.0568	0.6562	0.0066	0.0133	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 15: Fixed-effects estimations for Africa (media analysis)

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals
Terror	0.0163**				0.0247***	0.0109
	(0.037)				(0.006)	(0.233)
Political violence		-0.00769			-0.0248*	-0.00660
		(0.546)			(0.082)	(0.654)
Crime			-0.00908		-0.0297	-0.0507
			(0.880)		(0.628)	(0.377)
Ebola				0.000161	-0.00694	0.0226
				(0.990)	(0.578)	(0.201)
log(GDP)						1.229***
						(0.000)
Open						0.00366
						(0.188)
Number of observations	385	385	385	385	385	354
Countries	28	28	28	28	28	27
R^2	0.0122	0.0010	0.0001	0.0000	0.0220	0.1106
F-test	4.3967	0.3655	0.0228	0.0002	1.9868	6.6514
p value of F-test	0.0367	0.5458	0.8801	0.9896	0.0960	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 16: Fixed-effects estimations for the Americas (media analysis)

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals
Terror	-0.000847*			-0.000688	-0.000489	-0.000358
	(0.077)			(0.181)	(0.259)	(0.122)
Political violence		-0.000738**		-0.000597	-0.000529*	-0.000508***
		(0.032)		(0.100)	(0.084)	(0.002)
Crime			0.00783	0.0110	0.00634	0.00740*
			(0.378)	(0.223)	(0.405)	(0.094)
log(GDP)					0.972***	0.856***
					(0.000)	(0.000)
Open					0.00258**	0.00617**
					(0.034)	(0.011)
Bilateral exchange rate						0.00213**
						(0.014)
Constant	8.493***	8.492***	8.478***	8.486***	-0.824	1.840*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.358)	(0.074)
Number of observations	474	474	474	474	434	97
Countries	30	30	30	30	28	6
R^2	0.0070	0.0103	0.0018	0.0165	0.2307	0.6243
F-test	3.1439	4.6311	0.7788	2.4734	24.0512	23.5422
p value of F-test	0.0769	0.0319	0.3780	0.0611	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 17: Fixed-effects estimations for Asia-Pacific (media analysis)

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Terror	-0.00314				-0.00318	0.000786	-0.000778
	(0.439)				(0.454)	(0.808)	(0.668)
Political violence		-0.00547			-0.00538	-0.00827**	-0.00337
		(0.189)			(0.217)	(0.013)	(0.131)
Crime			0.0352		0.0323	-0.00149	-0.00148
			(0.159)		(0.200)	(0.938)	(0.893)
SARS				-0.00785***	-0.00761***	-0.00243	-0.00346***
				(0.005)	(0.006)	(0.256)	(0.001)
Avian flu				-0.00852	-0.00892	-0.000522	-0.00150
				(0.234)	(0.212)	(0.923)	(0.634)
log(GDP)						1.187***	1.074***
						(0.000)	(0.000)
Open						0.00133	-0.00299***
						(0.173)	(0.001)
Bilateral exchange rate							0.00505***
							(0.000)
Number of observations	439	439	439	439	439	416	153
Countries	29	29	29	29	29	28	9
R^2	0.0015	0.0042	0.0048	0.0227	0.0323	0.4734	0.7571
F-test	0.6003	1.7312	1.9925	4.7293	2.7031	48.9310	52.9941
p value of F-test	0.4389	0.1890	0.1588	0.0093	0.0204	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 18: Fixed-effects estimations for Europe (media analysis)

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Terror	0.000353				0.000375	0.000277	-0.000205
	(0.597)				(0.592)	(0.585)	(0.625)
Political violence		0.000183			-0.000114	-0.00119	-0.000359
		(0.869)			(0.921)	(0.157)	(0.703)
Crime			-0.00233		-0.00244	-0.00259	0.00490
			(0.671)		(0.658)	(0.520)	(0.162)
MERS				0.406	0.401	0.358	0.254
				(0.176)	(0.184)	(0.102)	(0.157)
log(GDP)						1.601***	1.541***
						(0.000)	(0.000)
Open						0.00413***	0.00319***
						(0.000)	(0.000)
Bilateral exchange rate							0.00994***
							(0.000)
Number of observations	722	722	722	722	722	676	497
Countries	44	44	44	44	44	41	30
R^2	0.0004	0.0000	0.0003	0.0027	0.0034	0.5049	0.4852
F-test	0.2796	0.0274	0.1811	1.8329	0.5678	106.8920	61.9318
p value of F-test	0.5971	0.8685	0.6706	0.1762	0.6861	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 19: Fixed-effects estimations for Middle East (media analysis)

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Terror	-0.00456***				-0.00400**	-0.00472***	-0.00503***
	(0.004)				(0.013)	(0.001)	(0.001)
Political violence		-0.00269*			-0.00192	-0.00188	-0.000501
		(0.050)			(0.173)	(0.120)	(0.742)
Crime			-0.0127		-0.00555	-0.0149*	-0.0102
			(0.215)		(0.593)	(0.096)	(0.509)
Avian flu				0.00119	-0.000307	0.000636	0.00294
				(0.911)	(0.977)	(0.943)	(0.741)
MERS				0.179	0.174	0.128	0.0865
				(0.199)	(0.202)	(0.275)	(0.454)
log(GDP)						1.182***	2.190***
						(0.000)	(0.000)
Open						0.0115***	0.00996**
						(0.000)	(0.040)
Bilateral exchange rate							0.00366
							(0.190)
Number of observations	205	205	205	205	205	198	78
Countries	13	13	13	13	13	13	5
R^2	0.0434	0.0199	0.0080	0.0087	0.0642	0.3352	0.5105
F-test	8.6598	3.8831	1.5467	0.8372	2.5641	12.8198	8.4752
p value of F-test	0.0037	0.0502	0.2151	0.4345	0.0286	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

2.5 Discussion of the results

The results presented show that, overall, as expected, risk factors have a negative effect on Swiss tourist arrivals. The results are largely consistent across the different estimation techniques and model specifications, which gives them credibility. The analysis shows that while tourists react both to actual risk factors and risk factors reported in the media, overall, the effect of the actual risk factors is much more pronounced. Thus, in general, Swiss tourists seem to base their decision on whether to visit a country or not, on actual data rather than on the intensity of the media coverage.

Regarding the effects of the risk factors, the analysis indicates that from a global perspective, Swiss tourists are not deterred by terrorism. This result is largely in line with the literature, which often only finds significant effects for specific incidents and destinations (Pizam & Fleischer 2002; Bhattarai *et al.* 2005; Raza & Jawaid 2013). In fact, it is suggested that the influence of terrorism on tourism is largely specific to destination and incidents and that overall, at least in the long run and from a global perspective, tourism is rather resilient to terrorism (Liu & Pratt 2017). Since in this paper the analysis is carried out from both a global and a regional perspective, and not from a country-level perspective, it is little surprising, that no significant effect of terrorism was found.

Similar to Fletcher and Morakabati (2008) as well as Saha and Yap (2014), who both find that the effect of political instability on tourism is far more severe than the effects of one-off terrorist attacks, I find that while from a global perspective, Swiss tourists are not deterred by terrorism, more persistent risk factors such as political violence and crime have a detrimental effect on Swiss tourist arrivals.

Regarding the health risks, I find mixed results. While there is a clear negative effect of SARS on Swiss tourist arrivals, there are no significant or only ambiguous effects for avian flu, MERS and Ebola. The results regarding the negative effect of SARS are consistent with the previous literature of Breda and Costa (2006), Chen *et al.* (2007), Kuo *et al.* (2008), Wang (2009), McAleer *et al.* (2010) and Min *et al.* (2011), which all find negative effects on tourism as well. The results finding no significant effect for the avian flu align with Chen *et al.* (2007) as well as Kuo *et al.* (2008), are, however, in contrast to those by McAleer *et al.* (2010), which find some evidence that fatalities caused by avian flu reduce tourist arrivals significantly. So far, to the best of my knowledge, no comparable study analyzed the impact of Ebola and MERS quantitatively. Thus, my analysis provides some first results. They should, however, be interpreted and generalized with some care, since they only concern the arrivals of Swiss tourists. Overall, the

evidence regarding health risks indicates that the impact on tourist arrivals is largely dependent on the specific health risk.

Because of different measurement scales, the size of the effects cannot directly be compared across all of the risk variables. Since the health risk variables as well as the political violence variable are measured as the number of fatalities, a direct comparison of their effect sizes is feasible. Perhaps rather surprisingly, when significant, one additional death caused by SARS has a much larger impact on Swiss tourist arrivals than one additional death caused by political violence. A reason for this result might be that Swiss tourists perceive it as more likely to perish due to an epidemic like SARS than to die in an armed conflict.

Interestingly, whether and which risk factors are relevant to Swiss tourists depends on the region. While for Africa and the Americas, risk factors seem to play at best only a very modest role in influencing the number of Swiss arrivals in the region, they do matter for the regions Asia-Pacific, Europe and the Middle East. A potential explanation for this phenomenon might be that tourists expect to be faced by certain risk factors such as e.g. crime in some regions and are therefore not as much deterred by a deterioration of the level of security as in other regions.

Finally, the analysis showed that risk factors are only partly able to explain the number of Swiss tourist arrivals in a region. A recurring pattern which is clearly visible among all analyzed regions is that economic development seems to have an important positive impact on Swiss tourist arrivals. On average, the higher the GDP of a country, the higher the number of Swiss tourist arrivals. Furthermore, in general, with the exception of the region Asia-Pacific, the more open a country is, measured by its trade intensity, the more Swiss tourists it will attract. From the additional regressions, which included the bilateral exchange rate, it can be concluded, that Swiss tourists are influenced by the price. The more affordable a destination becomes for Swiss tourists because of changes in the bilateral exchange rate, the more Swiss tourists will visit the destination.

2.6 Conclusions and implications

In this paper, I expand the knowledge about the importance of risk factors for Swiss outgoing tourists. This is the first comprehensive quantitative study to investigate the effect of different risk factors on Swiss tourist arrivals for a large sample of countries and years. The analysis shows that Swiss tourists react primarily to actual risks and only to a smaller extent to risks reported in the media. The analysis suggests that risk factors

such as political violence, crime and certain health risks are relevant to Swiss outgoing tourists. Interestingly, however, the relevance of these risk factors depends on the region of the destination. Additionally, while risk factors do matter, they are only able to explain Swiss tourist arrivals partly. Thus, while policy makers in tourist destinations are rightly concerned about risk factors and they should try to prevent them, it should be noted that further factors such as GDP, openness and the bilateral exchange rate, which is a proxy for prices, might have an even larger influence on Swiss tourist arrivals. However, since particularly in developing countries, tourism often contributes a substantial share to the GDP, these countries might be negatively affected by risk factors twofold. On the one hand, by the direct negative effect of the risk on tourist arrivals itself and on the other hand, by the indirect negative effect of a lower GDP. It is thus recommended that particularly in developing countries, destination managers and policy makers invest in a functioning risk management, which helps to avoid and mitigate risk factors and consequently reduce their detrimental effects. In contrast, destination managers and policy makers need not worry about biased media coverage, since Swiss tourists react primarily to actual risks. The study also has practical implications for the travel agency business. Knowing the extent to which Swiss tourists will react to risk factors helps businesses in their planning. Furthermore, travel agencies might differentiate themselves from competitors by giving their clients specific advice and information regarding the risk factors relevant to tourists depending on the destination.

In terms of future research, several issues might be worth pursuing. A limitation of this study is that it is based on data for Swiss tourist arrivals only. It is suggested that tourists will react differently to risk factors depending on their nationalities and levels of travel experience. Thus, my results might not be readily transferable to tourist arrivals from other countries. It might therefore be worthwhile to carry out the same analysis for further source markets. Another issue that deserves attention are spillover effects. The analysis considers for each country only risk factors within its boundaries. It is accepted that even countries that are not directly affected by a risk might indirectly be affected by risk factors of directly affected countries in relatively close proximity, because tourists might avoid entire regions, which they associate with a certain risk. Finally, it might be interesting to not only investigate how risk factors influence arrivals of Swiss tourists in absolute terms, but to investigate potential changes in tourists' travel behavior in more detail, such as shifts towards last minute bookings or an increase in group travels in light of risk factors.

2.A Appendices to chapter 2

2.A.1 Appendix I: Data and descriptive statistics

The following tables give an overview over the countries included in the dataset.

Table 20: Africa

1	Angola
2	Benin
3	Botswana
4	Burkina Faso
5	Cabo Verde
6	Cameroon
7	Central African Republic
8	Chad
9	Congo
10	Ethiopia
11	Gambia
12	Guinea
13	Kenya
14	Madagascar
15	Mali
16	Mauritius
17	Namibia
18	Nigeria
19	Rwanda
20	Senegal
21	Seychelles
22	Sierra Leone
23	South Africa
24	Swaziland
25	Tanzania, United Republic of
26	Togo
27	Uganda
28	Zimbabwe

Source: Own table

Table 21: Americas

1	Antigua and Barbuda
2	Bahamas
3	Barbados
4	Belize
5	Bolivia
6	Brazil
7	Canada
8	Chile
9	Colombia
10	Costa Rica
11	Cuba
12	Curaçao

13	Dominica
14	Dominican Republic
15	Ecuador
16	El Salvador
17	Grenada
18	Honduras
19	Jamaica
20	Mexico
21	Nicaragua
22	Panama
23	Paraguay
24	Peru
25	Saint Lucia
26	Saint Vincent and the Grenadines
27	Suriname
28	United States of America
29	Uruguay
30	Venezuela

Source: Own table

Table 22: Asia-Pacific

1	Australia
2	Bangladesh
3	Bhutan
4	Brunei Darussalam
5	Cambodia
6	China
7	Fiji
8	India
9	Indonesia
10	Japan
11	Kazakhstan
12	Kiribati
13	Korea, Republic of
14	Kyrgyzstan
15	Lao People's Democratic Republic
16	Maldives
17	Mongolia
18	Myanmar
19	Nepal
20	New Zealand
21	Palau
22	Philippines
23	Singapore
24	Sri Lanka
25	Taiwan Province of China
26	Tajikistan
27	Thailand

28	Tonga
29	Viet Nam

Source: Own table

Table 23: Europe

1	Albania
2	Armenia
3	Austria
4	Azerbaijan
5	Belarus
6	Belgium
7	Bosnia and Herzegovina
8	Bulgaria
9	Croatia
10	Cyprus
11	Czech Republic
12	Denmark
13	Estonia
14	Finland
15	France
16	Georgia
17	Germany
18	Greece
19	Hungary
20	Iceland
21	Ireland
22	Italy
23	Latvia
24	Liechtenstein
25	Lithuania
26	Luxembourg
27	Macedonia
28	Malta
29	Moldova, Republic of
30	Monaco
31	Netherlands
32	Norway
33	Poland
34	Portugal
35	Romania
36	Russian Federation
37	San Marino
38	Serbia
39	Slovakia
40	Slovenia
41	Spain
42	Sweden
43	Ukraine
44	United Kingdom

Source: Own table

Table 24: Middle East

1	Algeria
2	Bahrain
3	Egypt
4	Iran, Islamic Republic of
5	Israel
6	Jordan
7	Kuwait
8	Lebanon
9	Morocco
10	Saudi Arabia
11	Tunisia
12	Turkey
13	Yemen

Source: Own table

Table 25 depicts the correlation coefficients between all independent variables. Multicollinearity seems not to be an issue, as none of the correlation coefficients is higher than 0.7 (terror and political violence have with 0.479 the highest correlation).

Table 25: Correlation matrix for all independent variables

	Terror	Political violence	Crime	SARS	Avian flu	MERS	Ebola	log(GDP)	Open	Bilateral exchange rate
Terror	1.000									
Political violence	0.479	1.000								
Crime	0.031	0.166	1.000							
SARS	-0.006	-0.010	-0.011	1.000						
Avian flu	-0.000	-0.004	-0.021	0.027	1.000					
MERS	0.008	-0.007	-0.019	-0.002	-0.006	1.000				
Ebola	-0.004	-0.009	0.004	-0.002	-0.004	-0.002	1.000			
log(GDP)	-0.160	-0.442	-0.390	-0.087	-0.198	0.053	0.040	1.000		
Open	-0.098	-0.135	-0.174	-0.009	-0.051	-0.013	-0.034	0.288	1.000	
Bilateral exchange rate	0.035	0.190	0.138	0.045	0.180	0.058	0.070	-0.127	-0.149	1.000

Source: Own table

Table 26 presents the search terms used in the media analysis.

Table 26: Search terms of media analysis

Risk factor	Search terms
Terror	terror*
Political violence	krieg or guerre or politische instabilität or instabilité politique or unruhen or troubles (Subject: not Arts/Entertainment not Corporate/Industrial News)
Crime	mord or meurtre or kriminalität or criminalité (Subject: not Arts/Entertainment not Corporate/Industrial News)
SARS	sars or sras
Avian flu	vogelgrippe or grippe aviaire or H5N1
MERS	mers and virus
Ebola	ebola*

Source: Own table

2.A.2 Appendix II: Additional regression results

Table 27: Arellano-Bond system GMM estimations for all countries

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Lagged Swiss Arrivals	0.902***	0.902***	0.897***	0.906***	0.913***	0.791***	0.884***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Terror	-0.0000135				-0.00000823	-0.00000839	-0.00000220
	(0.448)				(0.605)	(0.580)	(0.827)
Political violence		0.00000935			-0.000000222	-0.00000169	-0.0000651**
		(0.163)			(0.992)	(0.937)	(0.044)
Crime			-0.00245		-0.00439*	-0.00432*	0.00329
			(0.247)		(0.062)	(0.062)	(0.495)
SARS				-0.00185*	-0.00188**	-0.00166**	-0.00175***
				(0.069)	(0.018)	(0.029)	(0.000)
Avian flu				0.00284	-0.000200	-0.00205	-0.00944
				(0.613)	(0.979)	(0.781)	(0.202)
MERS				0.000409	-0.00595*	-0.00463	-0.00337***
				(0.766)	(0.062)	(0.131)	(0.000)
Ebola				0.000152	-0.00729***	-0.000955	0.0818
				(0.127)	(0.006)	(0.135)	(0.582)
log(GDP)						0.399***	0.141**
						(0.000)	(0.012)
Open						0.00105	0.000486
						(0.125)	(0.224)
Bilateral exchange rate							0.00182***
							(0.001)
Number of observations	2,612	2,612	1,682	2,612	1,682	1,626	760
Countries	144	144	140	144	140	136	51
Wald chi-square test	3230.1700	3229.1598	3111.9813	3216.9761	3093.0237	3370.1799	4646.0821
p value of Wald test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 28: Arellano-Bond system GMM estimations for Africa

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals
Lagged Swiss Arrivals	0.677***	0.676***	0.778***	0.672***	0.796***	0.797***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Terror	0.000108				-0.0000223	-0.000229
	(0.252)				(0.970)	(0.704)
Political violence		0.0000132			0.0000230	0.0000297
		(0.173)			(0.891)	(0.863)
Crime			0.00793*		0.00495	0.00423
			(0.073)		(0.300)	(0.461)
Ebola				-0.000119	-0.00428***	-0.00101***
				(0.324)	(0.009)	(0.006)
log(GDP)						0.0527
						(0.678)
Open						-0.00102
						(0.707)
Number of observations	437	437	142	437	142	138
Countries	28	28	26	28	26	26
Wald chi-square test	398.4153	399.3216	318.0885	399.4435	309.4164	346.4897
p value of Wald test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 29: Arellano-Bond system GMM estimations for the Americas

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals
Lagged Swiss Arrivals	0.970***	0.970***	0.920***	0.920***	0.929***	0.882***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Terror	-0.0000106			-0.0000103	-0.00000718	-0.00000976
	(0.361)			(0.532)	(0.668)	(0.118)
Political violence		-0.0000321		-0.00000385	-0.0000157	-0.0000104
		(0.495)		(0.954)	(0.819)	(0.665)
Crime			0.000356	0.000332	0.000614	-0.00111
			(0.805)	(0.820)	(0.685)	(0.658)
log(GDP)					0.0990	0.134**
					(0.135)	(0.021)
Open					0.00249**	-0.000710
					(0.024)	(0.504)
Bilateral exchange rate						0.00120*
						(0.055)
Number of observations	548	548	398	398	382	86
Countries	30	30	29	29	28	6
Wald chi-square test	2994.7391	2995.0375	1587.8167	1580.5028	1540.6828	5341.3372
p value of Wald test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 30: Arellano-Bond system GMM estimations for Asia-Pacific

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Lagged Swiss Arrivals	0.918***	0.915***	0.899***	0.917***	0.895***	0.870***	0.926***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Terror	-0.0000704				0.00000617	0.0000268	0.0000140
	(0.286)				(0.935)	(0.717)	(0.694)
Political violence		-0.0000184			-0.0000110	-0.00000310	-0.0000907***
		(0.345)			(0.591)	(0.877)	(0.002)
Crime			-0.0456***		-0.0447***	-0.0563***	-0.00908
			(0.000)		(0.000)	(0.000)	(0.433)
SARS				-0.00167*	-0.00163*	-0.00158*	-0.00148***
				(0.069)	(0.053)	(0.052)	(0.000)
Avian flu				-0.000791	0.0117	0.00399	0.00644
				(0.862)	(0.126)	(0.602)	(0.370)
log(GDP)						-0.0252	-0.0300
						(0.592)	(0.400)
Open						0.00393***	0.000394
						(0.000)	(0.117)
Bilateral exchange rate							0.00145**
							(0.039)
Number of observations	522	522	311	522	311	311	131
Countries	29	29	28	29	28	28	9
Wald chi-square test	2077.7292	2082.9159	1983.7600	2099.1439	2008.6301	2140.7817	1213.4921
p value of Wald test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 31: Arellano-Bond system GMM estimations for Europe

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Lagged Swiss Arrivals	0.962***	0.963***	0.952***	0.962***	0.951***	0.914***	0.915***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Terror	-0.0000190				0.0000738	0.0000504	0.0000456
	(0.774)				(0.570)	(0.698)	(0.610)
Political violence		-0.0000475			-0.000328	-0.000382	-0.000418
		(0.187)			(0.408)	(0.337)	(0.341)
Crime			-0.0224*		-0.0225*	-0.0147	-0.0164
			(0.092)		(0.091)	(0.317)	(0.163)
MERS				-0.00732	-0.0216	-0.00279	-0.0278
				(0.923)	(0.781)	(0.971)	(0.510)
log(GDP)						0.186**	0.0474
						(0.021)	(0.516)
Open						-0.00103	0.000180
						(0.188)	(0.725)
Bilateral exchange rate							0.00292***
							(0.000)
Number of observations	856	856	710	856	710	678	484
Countries	44	44	44	44	44	41	30
Wald chi-square test	4269.4088	4274.3730	4142.0030	4268.4606	4129.2832	4228.0280	4090.2749
p value of Wald test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

Table 32: Arellano-Bond system GMM estimations for Middle East

	(1) Swiss Arrivals	(2) Swiss Arrivals	(3) Swiss Arrivals	(4) Swiss Arrivals	(5) Swiss Arrivals	(6) Swiss Arrivals	(7) Swiss Arrivals
Lagged Swiss Arrivals	0.913***	0.913***	0.946***	0.932***	0.952***	0.983***	0.856***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Terror	-0.000140***				-0.000122	-0.000122	-0.000319***
	(0.001)				(0.108)	(0.133)	(0.000)
Political violence		-0.000115*			0.0000518	0.0000485	0.0000410
		(0.061)			(0.517)	(0.560)	(0.694)
Crime			-0.0504**		-0.0520	-0.0189	0.0174
			(0.049)		(0.142)	(0.645)	(0.744)
Avian flu				-0.00418	-0.00931	-0.0114	-0.0123
				(0.584)	(0.473)	(0.406)	(0.242)
MERS				-0.00191**	-0.00282***	-0.00274***	-0.00277***
				(0.028)	(0.001)	(0.002)	(0.001)
log(GDP)						-0.0251	-0.125
						(0.722)	(0.335)
Open						0.00324*	-0.00273
						(0.058)	(0.330)
Bilateral exchange rate							0.00188
							(0.356)
Number of observations	249	249	121	249	121	117	42
Countries	13	13	13	13	13	13	5
Wald chi-square test	1046.1322	1025.9424	2559.2970	1021.5589	2547.5697	2506.4907	927.5911
p value of Wald test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: The dependent variable is the log of Swiss tourist arrivals. A constant is included but not displayed. *p*-values in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source: Own table

3 The effect of terrorism in Western Europe on tourist arrivals in Switzerland: A time series approach

3.1 Introduction

Most tourists look for a relaxing and safe trip. Hence, personal security is a major concern for tourists. Terrorism, which causes fear and insecurity is therefore generally accepted to have a detrimental effect on tourism (Arana & León 2008). In Europe, which has a relatively long history of terrorism, terrorist attacks have occurred with regular frequency. Examples of terrorist attacks, which were carried out in Western Europe in recent years and were widely covered by the international media, are the 7 July 2005 London bombings killing 56 people and injuring 784, the 2016 Nice truck attack killing 87 and injuring 433 or the 2016 Berlin Christmas market attack killing 12 and injuring 48 (National Consortium for the Study of Terrorism and Responses to Terrorism (START) 2018). Tourists have frequently been incidental victims of such attacks and have in some cases even been specifically targeted. So far, Switzerland has been spared from comparable attacks. The last fatal terrorist attack dates back to 2001, when a Swiss man disguised as a police officer opened fire with an assault rifle during a session of the Canton of Zug's local assembly, killing 14 local politicians (National Consortium for the Study of Terrorism and Responses to Terrorism (START) 2018). This attack has not reached comparable international attention since it was considered a domestic affair.

Several studies investigate the effect of terrorism on tourism. The majority of these studies are case studies, focusing on a specific incident or region (Pizam & Fleischer 2002; Raza & Jawaid 2013). However, the literature is sparse and inconclusive about spillover effects, in other words about how terrorism in one country affects tourism in other countries. Two opposing effects might occur, potentially even concurrently. One line of reasoning suggests that negative effects due to terrorism in one country are likely to affect adjacent countries adversely as well. This can be the result of tourists or tour operators combining several tourist destinations in a tour. If the tour gets cancelled due to terrorism in one destination, this will affect all included destinations. Another argument is that tourists might not differentiate between the security levels of different destinations. The other line of reasoning suggests that other countries in the region can benefit from a substitution effect as long as they are not themselves directly affected by terrorism. For instance, Drakos and Kutan (2003) find that terrorism in either Greece, Israel or Turkey has negative spillover effects on the other two countries. However, they suggest that

Italy might benefit from terrorism in the former countries since it is perceived as a safe alternative outside the Middle Eastern region.

For the case of Switzerland, so far, only controversial media reports and anecdotal evidence exist. While some reports claim that terrorism incidents in Western Europe have a negative influence on tourist arrivals in Switzerland, since guests cancel Europe tours and cannot differentiate between the security levels of different European countries, others claim that Switzerland can benefit since it is seen as a safe haven. Furthermore, it is possible that not all guest segments will show the same reaction to terrorism in Western Europe. Pizam *et al.* (2004) find that different nationalities differ considerably in their risk-taking behavior when travelling. Studies further show that tourists having already visited a country or a region perceive it as more positive than potential tourists that have not done so (Ingram *et al.* 2013). Potential first-time visitors to Switzerland might therefore be deterred more strongly by terrorism in Western Europe than tourists that have been to Switzerland before.

This paper is the first to analyze the nexus between terrorism in Western Europe and tourism in Switzerland. Specifically, it seeks to shed light on how tourist arrivals in Switzerland from different source markets are influenced by terrorism in Western Europe and if the effects differ between the various markets of origin. The findings are expected to provide valuable and useful information for tourism stakeholders to manage future terrorism crises.

The remainder of the chapter proceeds as follows. Section 2 reviews the most important literature regarding the effect of terrorism on tourism. Section 3 reviews the data and methodology used to conduct the research. Section 4 presents the results. Section 5 discusses the results and puts them into context. Finally, section 6 concludes.

3.2 Related literature

The theoretical rationale behind the relationship between terrorism and tourism is straightforward. The large majority of tourists desires a peaceful and safe holiday. Faced with terrorism in a destination, potential tourists might fear for their physical integrity, being involved in stressful situations or being unable to visit attractions according to schedule (Neumayer 2004). Thus, apart from the direct destruction of infrastructure and the existence of victims of terrorism, an important consequence and indirect cost of terrorism is the uncertainty it causes (Llorca-Vivero 2008). When terrorist incidents take

place in a destination, tourists might perceive that the risk involved in travelling to that destination to be increased, since they evaluate the destination as riskier. Several studies suggest that personal safety in a destination is among the most important determinants of destination choice for tourists (Sönmez & Graefe 1998; Arana & León 2008). The tourism industry is highly competitive and a number of destinations might be viewed as close substitutes. Thus, terrorist attacks can damage the image of a destination and deter potential tourists from travelling or induce them to switch to a destination that has similar characteristics, but is perceived to be safer. Therefore, the relationship between terrorism and tourism is generally expected to be negative.

While tourists are often incidental victims of terrorist attacks, from the perspective of the attackers it might sometimes be rational to specifically target tourists (Llorca-Vivero 2008). Apart from weakening the governments which they aim to defeat, terrorists often pursue further strategic goals such as their own organizational or ideological survival, which includes recruiting new terrorists, winning financial support and gaining attention in order to spread their ideology (Neumayer & Plümper 2016). By attacking the tourism sector, and in particular international tourists, they do not only damage an industry from which governments obtain revenues, but also attain extensive international attention, which is an essential part of their strategy and helps to achieve their goals.

The majority of studies empirically investigating the relationship between terrorism and tourism demand are case study analyses, focusing on a specific incident and region. For instance, Enders *et al.* (1992) exemplify for several European countries that terrorist attacks have a negative effect on tourism demand. For the case of Israel, Pizam and Fleischer (2002) find a negative effect of terrorism on tourism as well. Their results suggest that it is mostly the frequency and not the level of severity of the terrorist attacks that affects the arrivals of tourists in Israel. Bassil (2014) confirms the negative effect of terrorism on tourism demand in Israel. In contrast, however, he finds that the effect of terrorism on tourism depends on the intensity of the terrorist attacks. Surprisingly, for the case of Lebanon, Bassil (2014) finds that overall, terrorism has a positive effect on tourist arrivals. It is suggested by the author that the Lebanese diaspora, which constitutes a large share of total tourist arrivals, might not be deterred by terrorism as easily and may even increase the frequency of family visits in case of increased insecurity in the country. For the case of Turkey, both Yaya (2009) and Bassil (2014) find a negative impact of terrorism on tourism. Similarly, for the case of Pakistan, Raza and Jawaid (2013) find significant negative short-run as well as long-run effects of terrorism on tourism.

Other studies use panel data for a multitude of countries in order to analyze the effect of terrorism on tourism. For instance, Saha and Yap (2014) study the effect of terrorism on tourism using panel data from 139 countries for the time period 1999-2009 by taking into consideration interaction effects between political instability and terrorism. Surprisingly, they find that terrorist attacks increase tourism demand in countries with low to moderate political risk. For higher levels of political instability, terrorism lowers the number of tourist arrivals as anticipated. Similarly, Liu and Pratt (2017) investigate the relationship between terrorism and tourism in 95 countries for the period 1995-2012. From a global perspective, they find no long-run effect of terrorism on international tourism demand and only a rather small effect in the short-run. From a country-level perspective, they find for 9 out of the 95 analyzed countries a long-run effect and for 25 out of the 95 countries a short-run effect of terrorism on tourism demand. Thus, it might be concluded that the effect of terrorism on tourism is largely incident- and country-specific.

Furthermore, Rittichainuwat and Chakraborty (2009) point out that, although usually highly correlated, the degree to which tourists react to terrorism depends on their risk perception rather than on the actual risk circumstances in a destination. Thereby, media reports influence potential tourists' risk perception of a destination significantly (Cavlek 2002). Furthermore, the literature points to the direction that the perception of riskiness also depends on a range of tourists' characteristics such as for instance their nationality (Seddighi *et al.* 2001; Pizam *et al.* 2004; Güres *et al.* 2011) or previous travel experience (Kozak *et al.* 2007; Rittichainuwat & Chakraborty 2009; Ingram *et al.* 2013), with the latter indicating that tourists will be deterred less by terrorist attacks if they have travelled to the destination before. Finally, the risk-taking behavior of tourists will not only depend on tourists' perception of risks, but also on their personality traits (Lepp & Gibson 2003, 2008).

Some authors have started to investigate the effects of terrorism in one destination on tourism in other destinations. Such effects include tourists substituting riskier destinations for safer ones or avoiding regions, in which one or several destinations experience terrorism entirely, in other words, behavior which leads to spillover effects. The literature on spillover effects, meaning the impact of terrorism in one destination on tourism in another destination, is relatively scant. The few existing studies are mostly based on case studies and focused on a specific incident or region.

Several of these discuss the effect of the 9/11 attacks in New York City on tourism in destinations other than the US. Bhattarai *et al.* (2005) investigate the effect of the 9/11 attacks on the tourism industry in Nepal and evaluate it as negative. Arana and León

(2008) focus on the short-run impact of the 9/11 attacks in New York City on tourists' preferences for competing destinations in the Mediterranean and the Canary Islands. They find that the attacks had caused a shock to tourists' utility, which on average resulted in an overall decline in willingness to pay. Furthermore, while some destinations experienced a strong negative impact on their image, the image of others seemed to improve because of the attacks. For the case of Taiwan, Wang (2009) finds a significant negative effect of the 9/11 attacks on Japanese tourist arrivals, which form the largest source market of inbound tourists to Taiwan. Overall, the extreme event of the 9/11 attacks seems to have led to a decline in travel activity and to negative spillover effects far beyond New York City.

The remaining studies investigating spillover effects of terrorist incidents mostly focus on countries in the Mediterranean region or countries of the Islamic world. For instance, Drakos and Kutan (2003) focus in their analysis of the period 1991-2000 on the effect of terrorism in Greece, Israel and Turkey on each other's relative tourism market share, with Italy serving as a control country, representing the rest of the Mediterranean region. Their findings reveal that there are both substitution and contagion effects between the former three countries. However, overall, the contagion effect dominates. Only around 11% of aggregate losses in market shares is directed toward other destinations within the group of countries under consideration, whereas around 89% flows out of the region. Thus, there are significant negative spillover effects on the other countries. The only country that might benefit from terror attacks in the former countries is Italy, since it is likely to be perceived as a safe alternative outside the Middle Eastern region, while still offering similar characteristics. Similarly, Bassil (2014) investigates potential spillover effects of both domestic and transnational terrorism on tourism demand between Lebanon, Turkey and Israel in the period 1995-2007. While he finds significant spillover effects for all countries under investigation, the evidence regarding the sign of the effect is mixed. The results indicate that terrorism in Israel has a negative effect on tourist arrivals in Lebanon and Turkey, demonstrating contagion effects. Likewise, terrorism in Turkey has a negative effect on tourist arrivals in Israel and Lebanon. Thereby, he finds that the highest negative spillover effect runs from Israel to Lebanon and Turkey, indicating that tourists are very sensitive to terrorism in Israel. Tourists possibly fear that instabilities in Israel might initiate a conflagration in the whole region. In contrast to these results, Bassil (2014) finds that terrorism in Lebanon has a positive effect both on tourist arrivals in Israel as well as on tourist arrivals in Turkey, indicating that tourists might see these countries as a substitute for Lebanon.

Neumayer and Plümper (2016) investigate the effects of terrorist attacks executed in Islamic countries on tourists from Western countries in the period 1995-2013. They illustrate that these terrorist attacks do not only directly negatively affect tourist flows from the countries whose nationals have been attacked to the country where the attack occurred, but that they generate significant spillover effects. While smaller in size than the direct negative effect, the authors' evidence suggests the presence of three different spillover effects. Firstly, the attacks have a detrimental effect on tourism flows from other Western source countries to the destination country in which the attack happened. Secondly, the attacks have a negative effect on tourism flows from the country whose nationals have been attacked to other Islamic destination countries. Finally, the attacks affect tourism flows from other Western source countries to other Islamic destination countries adversely. This implies that terrorist attacks in any Islamic country on any Western national will affect tourism inflows from all Western countries to all Islamic destination countries negatively.

From the literature review, overall, it might be concluded that spillover effects between countries are present. However, the literature is inconclusive about the direction of these effects. Whether a contagion or a substitution effect prevails seems to depend on the specific case. Based on the literature, I derive the following two main hypotheses:

Hypothesis I: *Terrorism in Western Europe has spillover effects on tourist arrivals in Switzerland.*

Hypothesis II: *The sign of the spillover effects of terrorism in Western Europe on tourist arrivals in Switzerland depends on the specific source market.*

Tourists from European markets normally travel individually to Switzerland, an important share of them have previous travel experience in Switzerland and they are expected to have relatively easy access to information about the security level in Switzerland and thus should be able to differentiate between the security levels of different European countries. For these reasons, it is expected that tourists from European markets might see Switzerland as a safe substitute for other destinations within the region. Thus, it is expected that:

Hypothesis IIa: *Terrorism in Western Europe has positive spillover effects on tourist arrivals in Switzerland from European source markets*.

In contrast, the share of tourists travelling in pre-arranged group tours, often including several destinations, is much higher among tourists from distant markets. Thus, a cancellation of a trip due to terrorism in another Western European country is more likely to negatively affect tourist arrivals from these countries in Switzerland as well. Additionally, the share of potential first-time visitors is higher among distant source markets, which is expected to reinforce adverse spillover effects on tourist arrivals in Switzerland. Finally, assessing the security level of Switzerland is expected to be costlier, since access to information and news about the country-specific security level in Switzerland is less widespread. Tourists from distant markets are thus expected to be more likely to generalize the security level in Western Europe. For these reasons, it is hypothesized that:

Hypothesis IIb: *Terrorism in Western Europe has negative spillover effects on tourist arrivals in Switzerland from distant markets.*

3.3 Data and methodology

3.3.1 Data and variables

3.3.1.1 Tourism demand

The dependent variable is tourism demand in Switzerland, which is measured by the number of monthly tourist arrivals in Switzerland from Switzerland's most important source markets. The data is drawn from the tourist accommodation statistics (HESTA) of the Federal Statistical Office. Specifically, monthly arrivals in Switzerland by tourists' country of origin for the five most important European and the five most important distant source markets regarding the number of arrivals in 2017 is used (see Table 33).

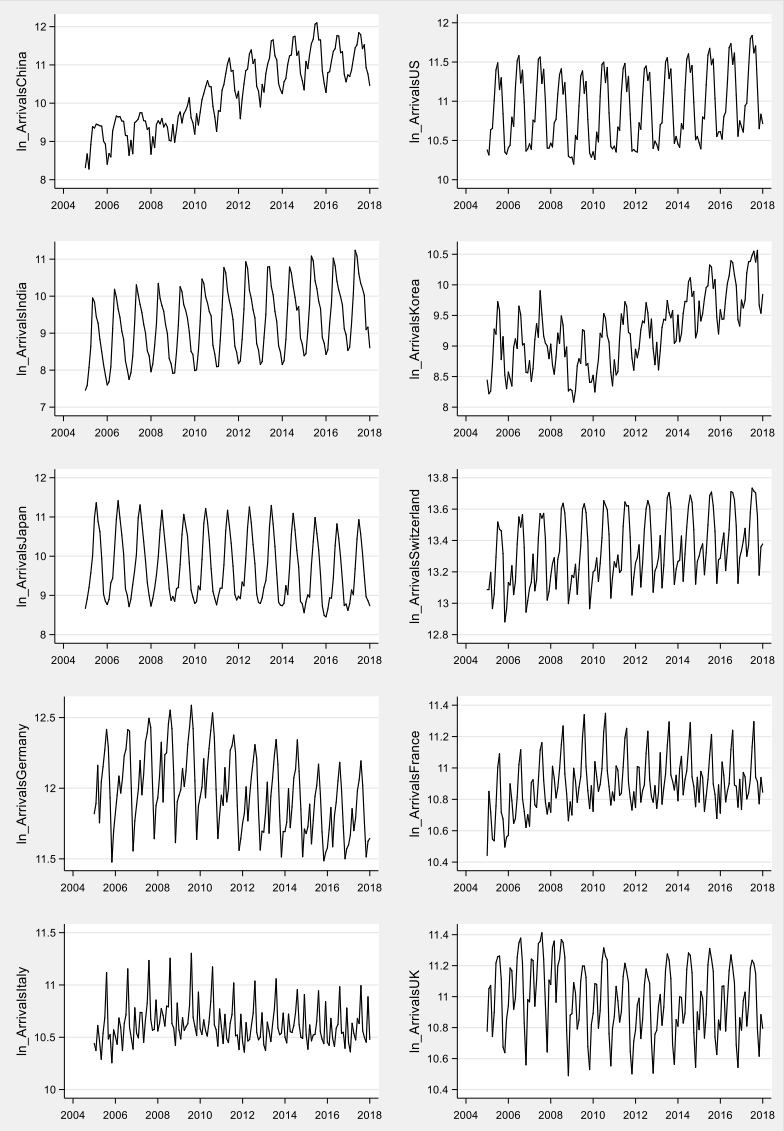
Table 33: Number of arrivals by country of origin

No.	Year	Country of origin	Number of arrivals
1	2017	Switzerland	8,672,753
2	2017	Germany	1,652,977
3	2017	China (without Hong Kong)	974,756
4	2017	US	957,796
5	2017	UK	708,193
6	2017	France	680,806
7	2017	Italy	487,914
8	2017	India	326,454
9	2017	South Korea	315,074
10	2017	Netherlands	279,385
11	2017	Spain	234,456
12	2017	Japan	227,010

Source: Own table based on data from Federal Statistical Office (2018)

The five largest European source markets are Switzerland, Germany, UK, France and Italy. The five largest distant markets are China, the US, India, South Korea and Japan. Since the data is continuously available only from January 2005 onwards, data for the time span January 2005 to January 2018 is used. More specifically, tourism demand is represented using the variable $Arrivals\, i_{\,t}$, measured as the logarithmized[18] number of arrivals from the source country i in month t for the time period January 2005 to January 2018. Figure 1 exhibits time plots of the ten logarithmized tourist arrivals series. The key feature of all the series is their strong seasonal fluctuations.

Figure 1: Time plots of ten major arrival time series



Source: Own figure based on data from Federal Statistical Office (2018)

[18] Since for some of the untransformed arrivals series, the variance increases over time and to ease the interpretation (Lim & McAleer 2001), logarithmic transformations are applied to each of the tourist arrivals series.

3.3.1.2 Terrorism

Data on the exogenous variable terrorism is drawn from the open-source Global Terrorism Database (GTD), which is maintained by the National Consortium for the Study of Terrorism and Responses to Terrorism (START) at the University of Maryland (National Consortium for the Study of Terrorism and Responses to Terrorism (START) 2018).[19] The database includes information on terrorist events from around the world from 1970-2017.[20] Additionally, and in contrast to many other event databases, the GTD provides detailed information for each incident such as the date, the location, the number of casualties and if available information about the attacker. Due to its accessibility, its coverage and completeness, this study relies on data from the Global Terrorism Database (GTD) in order to measure terrorism. Geographically, the focus lies on Western Europe[21], since incidents in Western European countries are most likely to influence tourist arrivals in Switzerland due to the countries proximity and similarity to Switzerland. Specifically, terrorism is measured using the variable $terror_t$, which is defined as the sum of confirmed fatal as well as non-fatal terrorism victims per month t in Western Europe for the time span January 2005 to December 2017.

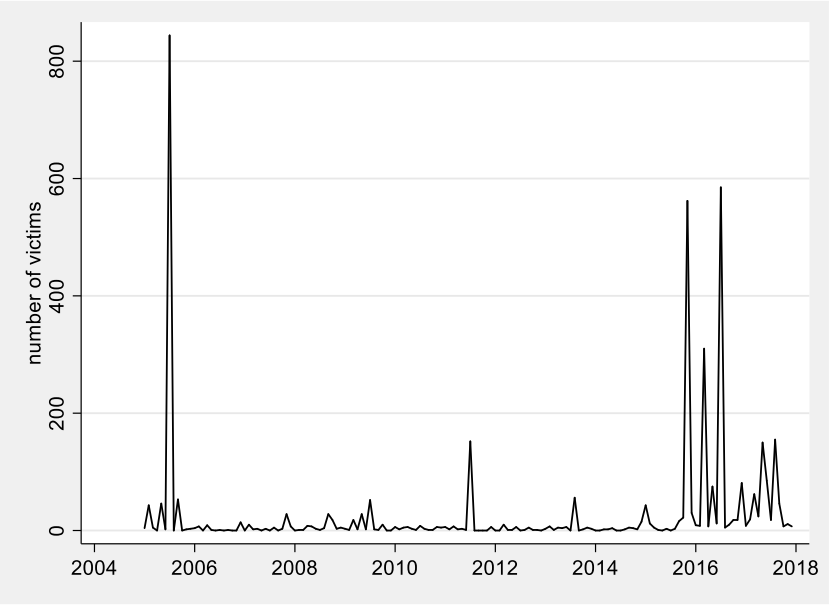
Figure 2 depicts the time plot of the exogenous variable $terror_t$. The time series exhibits four prominent spikes, which indicate months with significantly more than 200 victims due to terrorism in Western Europe. These spikes appear for the months of July 2005 (UK: 7 July 2005 London bombings), November 2015 (France: November 2015 Paris attacks), March 2016 (Belgium: 2016 Brussels bombings) and July 2016 (France: 2016 Nice truck attack). Furthermore, the time plot shows medium to large sized spikes for the months of July 2011 (Norway: 2011 Norway attacks), May 2017 (UK: Manchester Arena bombing) and August 2017 (Spain: 2017 Barcelona attacks). Finally, a relatively large number of smaller to medium sized incidents with up to 100 victims can be observed throughout the time span under consideration.

[19] Several other terrorism databases such as the International Terrorism: Attributes of Terrorist Events (ITERATE) database, the Rand Database of Worldwide Terrorism Incidents (RDWTI), the Protocol for the Assessment of Nonviolent Direct Action (PANDA) or the World Incident Tracking System (WITS) are frequently used in the literature. However, most of these databases are only available against a substantial fee or cover a limited period of years.

[20] Data for the year 1993 was lost and recovered from a PGIS Risk Assessment Report for 1993. The data is available in the appendix of the GTD Codebook.

[21] Western Europe includes the following countries: Andorra, Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Gibraltar, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, Vatican City.

Figure 2: Time plot of terrorism victims time series in Western Europe



Source: Own figure

3.3.2 Model identification, selection and estimation strategy

A seasonal autoregressive moving average model with exogenous variables (SARMAX) approach is selected to estimate the impact of terrorism in Western Europe on tourist arrivals in Switzerland.

This approach is largely based on the integrated autoregressive moving-average (ARIMA) models proposed by Box and Jenkins (1970), which are predominant in the tourism literature in order to model and forecast tourism demand (Lim & McAleer 2002; Song & Li 2008; Chu 2009). The Box-Jenkins method applies autoregressive moving average (ARMA) or autoregressive integrated moving average (ARIMA) models to find the best fit of a time series based on its own past values. In the current case, the method can be used in order to capture the current pattern of tourist arrivals from a particular source market based on its past pattern. An ARIMA model is a generalization of an ARMA model, since an ARIMA process is obtained by integrating an ARMA process. The models are often referred to as ARMA (p, q) and ARIMA (p, d, q) models, where p, d and q are integers greater than or equal to zero. While the integers p and q refer to the order of the autoregressive (AR) and the order of the moving average (MA) components of the model, integer d refers to the integrative (I) component of the model and describes the degree of differencing applied to reach a stationary process. The integrative component is crucial in the case of non-stationary data, since the models require a

time series to be stationary (Box-Steffensmeier *et al.* 2014).[22] ARIMA models can easily be extended to seasonal ARIMA (SARIMA) models in order to account for seasonality in the data. In order to control for further explanatory variables, after identifying a best fitting ARMA or ARIMA model, the model can be extended with one or several explanatory exogenous variables X. These models are often called ARMAX models.[23] Thus, in the present case, after identifying for each of the ten tourist arrivals series to Switzerland a best fitting seasonal ARMA or ARIMA model, the models will be extended with the exogenous variable $terror_t$ in order to measure the impact of terrorism in Western Europe on tourist arrivals in Switzerland for the ten source markets.

Starting with the model building, in the present case, given a tourist arrivals time series of data A_t, where A_t is short for the variable $Arrivals\ i_t$, that is the logarithmized number of arrivals from one of the ten source markets to Switzerland, then the ARIMA model is given by:

$$(1 - B)^d \phi(B) A_t = \theta(B) Z_t$$

where *B* is the backward shift operator, the ϕ_i are the parameters of the autoregressive (AR) part, the θ_i are the parameters of the moving average (MA) part and the Z_t are the error terms of the model. The error terms Z_t are assumed to be independently, identically distributed variables sampled from a normal distribution with zero mean. Furthermore, *d* is a positive integer, which controls the number of differencing. In case that *d* is equal to zero and no integrating is necessary to reach a stationary process, the model simplifies to an ARMA model:

$$\phi(B) A_t = \theta(B) Z_t$$

Time series of tourism data observed at monthly frequencies often exhibit seasonality (Lim & McAleer 2001). This is also the case for the ten monthly tourist arrivals series of

[22] A stationary time series does not have statistical properties that depend on time.

[23] Several comparable studies have in the past used this modelling framework since it is particularly suited for the time series nature of the data (Sloboda 2003; Kuo *et al.* 2008; Lim *et al.* 2009). While other time series techniques, such as e.g. VAR models have been used in the past as well, these models might not be the best option for the present analysis, since they have higher data requirements and primarily because it is believed that in the case under consideration, the causality occurs in only one plausible direction, meaning that terrorism in Western Europe might affect tourism in Switzerland, but not the other way around.

Switzerland, all of which exhibit seasonality.[24] Not controlling for seasonality might lead to spurious and biased results (Kuo *et al.* 2008). Therefore, the ARIMA models are extended to seasonal ARIMA (SARIMA) models in order to account for seasonality.[25] In the context of the Box-Jenkins methodology a seasonal model can be denoted as SARIMA (p, d, q):

$$\phi(B)\Phi(B^s)(1-B)^d(1-B^s)^D A_t = \theta(B)\Theta(B^s)Z_t$$

where *s* is the period of seasonality, meaning the period over which the process repeats itself and thus in the present case of monthly data *s*=12, *d* represents the non-seasonal differencing, while *D* stands for the seasonal differencing. The ϕ_i and the Φ_i are the non-seasonal and seasonal parameters of the autoregressive (AR) part, while the θ_i and Θ_i refer to the non-seasonal and seasonal parameters of the moving average (MA) part.

After having obtained the best fitted SARIMA model for each of the ten arrival series, in a next step, the exogenous variable $terror_t$, is introduced to each of the models to obtain seasonal ARIMAX models:

$$\phi(B)\Phi(B^s)(1-B)^d(1-B^s)^D A_t = \theta(B)\Theta(B^s)Z_t + \rho(B)terror_t$$

where additionally to the terms of the SARIMA model, the ρ_i capture the effects of the exogenous variable $terror_t$, which measures terrorism in Western Europe at different lags on the dependent variable A_t, that is the tourist arrivals.

The procedure of the time series modeling can be divided into the three steps model identification, parameter estimation and model checking. First, an appropriate SARIMA model is identified and selected by diagnosing the data. It is ensured that the variables are stationary and that seasonality is controlled for by applying seasonal differencing. In order to test for a unit root process, several tests such as the augmented Dickey-

[24] Seasonality can be defined as any cyclical or periodic fluctuation in a time series that repeats itself at the same phase of the cycle or period (Box-Steffensmeier *et al.* 2014).
[25] Alternatively, in order to avoid problems due to seasonality, several tourism demand studies use annual instead of monthly data (Garín-Muñoz & Amaral 2000; Garín-Muñoz 2006; Garín-Muñoz & Montero-Martín 2007; Habibi *et al.* 2009). However, due to this generalization, information is likely to get lost. Another option is to seasonally adjust the time series by estimating and removing the seasonal effects (McAleer *et al.* 2010).

Fuller test are available. In case of a unit root, differencing is applied. Differencing removes the stochastic trend, leaving a time series that can then be used in the context of a Box-Jenkins model. A failure to diagnose non-stationarity and model it appropriately might lead to faulty inferences. In case no unit root is present, the model simplifies to a SARMA model. Next, the autocorrelation function (ACF) and the partial autocorrelation function (PACF) are used as an indication to decide which autoregressive (AR) or moving average (MA) components should be used in the model.[26] However, since in reality both the ACF and PACF of a time series are often not as clear as theoretically presented and noise is likely to be present, several competing models are estimated (Box-Steffensmeier *et al.* 2014).

In a second step, the previously diagnosed competing models are estimated. The parameters are estimated using computation algorithms to arrive at coefficients that best fit the selected SARIMA model. It is important to both over- and under-fit the models to ensure its proper specification. The model specification with the best information criteria is chosen.[27]

Finally, it is tested whether the estimated model conforms to the specifications of a stationary univariate process, by analyzing its residuals. If each filter of the data has been removed, one should be left with white noise. White noise describes the stochastic process left after filtering out the time-based dynamics of the data. By definition, a white noise process is normally distributed with mean zero and constant variance (Box-Steffensmeier *et al.* 2014). Furthermore, there is no correlation in white noise series over time (Box-Steffensmeier *et al.* 2014).[28]

Subsequently, the exogenous variable is also tested for stationarity. The exogenous variable and its lags can then be included in the best fitted SARMA or SARIMA model.

[26] The ACF statistic measures the correlation between a_t and a_{t+k} where k is the number of lead periods into the future. Theoretically, every time series has a unique ACF, meaning that it can be matched to a prototype that is known to represent a particular data-generating process. However, especially higher order AR(p) and MA(q) models yield very similar ACFs, which makes a differentiation challenging. In these cases, the partial autocorrelation function PACF supports the identification process. The PACF(k) measures the correlation between time series observations that are k units apart, after the correlation at intermediate lags has been controlled for, meaning that the PACF(k) is the correlation between a_t and a_{t+k} after removing the effects of the intermediate a's. (Box-Steffensmeier *et al.* 2014)

[27] The two most frequently used criteria for model selection are the Akaike information criteria (AIC) and the Schwartz Bayesian information criteria (BIC), whereby the model with the smallest value of the statistic is chosen. The criteria reward explanatory power, but not at the expense of parsimony. That is, although always adding additional terms leads to a better model fit, doing so would come at a loss of degrees of freedom (Box-Steffensmeier *et al.* 2014).

[28] The Portmanteau Q-statistic tests for the presence of white noise residuals. A significant Q-statistic suggests that there are at least one or more lags present that are different from zero, indicating that the series is not white noise.

These over-parametrized ARMAX models are then simplified by testing the statistical significance of the longest lag and repeatedly shortening the lag structure by one period until the last lag coefficient is statistically significant or no lag is included in the model anymore.

3.4 Results

3.4.1 Model building and validation

Since the seasonal ARMAX model concept requires all dependent and independent variables to be stationary series, the first step is to implement unit root tests for stationarity. In order to ensure that all dependent and independent variables are stationary, for all seasonally first-differenced logarithmized arrival series as well as for the untransformed terrorism time series, the augmented Dickey-Fuller (ADF) test is employed to perform the unit root test. The results show that all series are stationary time series processes (see Appendix I: Tests and model identification). Before applying a seasonal ARMAX model to estimate the relationship between terrorism victims in Western Europe and tourist arrivals in Switzerland, plausible seasonal ARMA models for each arrival time series must be identified. Following the Box-Jenkins Methodology, autocorrelation functions (ACF) and partial autocorrelation functions (PACF) are calculated in order to support the model building process.[29] Various candidate seasonal ARMA models are fitted for each arrival time series. The model choice is based on the Akaike Information Criterion (AIC) as well as on the Portmanteau Q-statistic for white noise.[30] Only models with well-behaved residuals are taken into consideration.

Table 34 presents the best fitted seasonal ARMA model for each of the seasonally first-differenced logarithmized European arrival series.

[29] The ACF and PACF for the European source market Switzerland and the distant source market China are exemplarily presented in Appendix I: Tests and model identification.
[30] The test results are presented in Appendix I: Tests and model identification.

Table 34: Best fitted seasonal ARMA models for European markets

	Switzerland b/se	**Germany** b/se	**UK** b/se	**France** b/se	**Italy** b/se
constant	0.021***	-0.003	0.001	0.025*	0.004
	(0.003)	(0.030)	(0.015)	(0.015)	(0.013)
ARMA					
L.ar	1.801***	0.633***	0.375***	0.967***	0.255***
	(0.126)	(0.119)	(0.067)	(0.031)	(0.083)
L2.ar	-0.856***	0.334***	0.504***		0.251***
	(0.120)	(0.110)	(0.070)		(0.083)
L3.ar					0.249***
					(0.080)
L.ma	-1.778***	-0.516***		-0.668***	
	(0.108)	(0.111)		(0.084)	
L2.ma	0.877***				
	(0.095)				
ARMA12					
L.ar	-0.417***	-0.552***		0.349**	
	(0.091)	(0.090)		(0.174)	
L2.ar	-0.290***	-0.298***			
	(0.100)	(0.076)			
L3.ar	-0.284***				
	(0.095)				
L.ma			-0.599***	-1.354***	-0.445***
			(0.077)	(0.214)	(0.081)
σ	0.035***	0.050***	0.051***	0.033***	0.061***
	(0.002)	(0.003)	(0.003)	(0.005)	(0.004)
N	145	145	145	145	145
AIC	-538.010	-438.720	-432.594	-475.975	-383.190
BIC	-511.219	-417.883	-417.711	-458.115	-365.330

Source: Own table based on data from Federal Statistical Office (2018)

Table 35 presents the best fitted seasonal ARMA model for each of the distant markets' seasonally first-differenced logarithmized arrival series.

Table 35: Best fitted seasonal ARMA models for distant markets

	China	**US**	**India**	**South Korea**	**Japan**
	b/se	b/se	b/se	b/se	b/se
constant	0.194***	0.028	0.091***	0.105**	-0.029***
	(0.034)	(0.021)	(0.007)	(0.042)	(0.010)
ARMA					
L.ar	0.403***	0.455***		0.940***	0.378***
	(0.078)	(0.076)		(0.037)	(0.097)
L2.ar	0.394***	0.227**			0.252***
	(0.072)	(0.106)			(0.084)
L3.ar		0.231**			
		(0.102)			
L.ma			0.546***	-0.438***	
			(0.082)	(0.098)	
L2.ma			0.331***		
			(0.101)		
L3.ma			0.325***		
			(0.101)		
ARMA12					
L.ma	-0.663***		-0.702***	-0.650***	-0.657***
	(0.077)		(0.086)	(0.095)	(0.082)
L.ar		-0.507***			
		(0.089)			
L2.ar		-0.469***			
		(0.099)			
L3.ar		-0.218**			
		(0.097)			
σ	0.192***	0.046***	0.094***	0.138***	0.105***
	(0.011)	(0.003)	(0.006)	(0.010)	(0.006)
N	145	145	145	145	145
AIC	-49.563	-455.387	-252.483	-145.972	-226.280
BIC	-34.680	-431.573	-234.623	-131.088	-211.396

Source: Own table based on data from Federal Statistical Office (2018)

After selecting the best fitted seasonal ARMA models, in a next step, the independent variable, which measures terrorism, is introduced to the models to obtain seasonal ARMAX models. It is suggested that tourists might react with some delay to terrorism, for example, because they are locked into bookings. Therefore, I start with over-parametrized models including the independent variable and its first 6 lags. The results of these initial ARMAX models are presented in Appendix II: Initial ARMAX models.

3.4.2 Empirical results

The initial ARMAX models are simplified by testing the statistical significance of the longest lag and shortening the lag structure by one period if the null hypothesis that the effect at the longest lag is zero cannot be rejected. The shortening is continued until the

last lag coefficient is statistically significant or no lag is included in the model anymore. Table 36 shows the results of the simplified ARMAX models for estimating the impacts of terrorism in Western Europe on tourist arrivals in Switzerland for the European source markets Switzerland, Germany, UK, France and Italy. The estimated coefficients of the lags of the terror variable can only be directly interpreted as the impacts of each terror victim in Western Europe on tourist arrivals in Switzerland if only distributed lags are included in the ARMAX model, not, however, if AR terms are included, as it is the case for the models of all the analyzed European markets. Still, while the coefficients in Table 36 cannot be interpreted as the exact magnitude of the effect of terrorism in Western Europe on tourist arrivals in Switzerland, they show how terrorism influences tourist arrivals regarding timing and direction of the effect.

The results in Table 36 show that terrorism in Western Europe has no significant effect on Swiss tourist arrivals in Switzerland. However, terrorism in Western Europe has a positive effect on German tourist arrivals. An increase in the number of victims due to terrorism in Western Europe in the current month leads five months later to an increase in German tourist arrivals in Switzerland. However, the effect is only statistically significant at the 10% level. Similarly, a positive effect of terrorism on tourist arrivals from the UK is found. An increase in terrorism victims in the current period leads to a statistically significant increase in tourist arrivals from the UK five and six months later. For French tourist arrivals the positive effect of terrorism in Western Europe on tourist arrivals in Switzerland is even more prominent. An increase in terrorism victims in the current period leads to an increase in French tourist arrivals in Switzerland three, four, five and six months later. The coefficients for all of these months are statistically significant at the 1% level. As for the impact of terrorism on Italian tourist arrivals in Switzerland, I find a somewhat different pattern. While terrorism reduces Italian tourist arrivals two months later, there is a positive effect observable three months later.

Table 36: Estimates of ARMAX models for European markets

	Switzerland	Germany	UK	France	Italy
	b/se	b/se	b/se	b/se	b/se
terror		0.000078	0.000022	-0.000010	-0.000052
		(0.000079)	(0.000060)	(0.000030)	(0.000034)
L.terror		-0.000043	-0.000053	0.000018	0.000013
		(0.000038)	(0.000038)	(0.000039)	(0.000046)
L2.terror		0.000031	-0.000071	-0.000015	-0.000101**
		(0.000044)	(0.000057)	(0.000030)	(0.000042)
L3.terror		0.000053	0.000052	0.000111***	0.000084*
		(0.000052)	(0.000052)	(0.000037)	(0.000045)
L4.terror		0.000044	0.000075	0.000122***	
		(0.000048)	(0.000051)	(0.000041)	
L5.terror		0.000087*	0.000108**	0.000160***	
		(0.000048)	(0.000052)	(0.000037)	
L6.terror			0.000123***	0.000098***	
			(0.000037)	(0.000027)	
constant	0.021112***	-0.011090	-0.007804	0.009371	0.005531
	(0.003033)	(0.030783)	(0.015253)	(0.014653)	(0.013532)
ARMA					
L.ar	1.801235***	0.610241***	0.354276***	0.979228***	0.277535***
	(0.122060)	(0.114029)	(0.079700)	(0.021248)	(0.082775)
L2.ar	-0.856355***	0.357875***	0.519655***		0.209162**
	(0.149586)	(0.107456)	(0.080625)		(0.085876)
L3.ar					0.274983***
					(0.091403)
L.ma	-1.777514***	-0.509064***		-0.681191***	
	(0.188677)	(0.100641)		(0.072049)	
L2.ma	0.876666***				
	(0.218252)				
ARMA12					
L.ar	-0.417471***	-0.565933***		0.526906***	
	(0.091113)	(0.084519)		(0.095850)	
L2.ar	-0.290040***	-0.293887***			
	(0.094556)	(0.108387)			
L3.ar	-0.284370***				
	(0.099430)				
L.ma			-0.648306***	-0.999975***	-0.421397***
			(0.148454)	(0.000545)	(0.121680)
σ	0.034866***	0.049121***	0.049310***	0.039943***	0.059957***
	(0.002188)	(0.003168)	(0.003018)	(0.003734)	(0.003746)
N	145	144	144	144	144
AIC	-538.009629	-427.563767	-426.703520	-474.147476	-378.887084
BIC	-511.219025	-388.956195	-391.065761	-435.539903	-349.188951

Notes: The dependent variables are the seasonally differenced logarithmized number of arrivals
Source: Own table based on data from Federal Statistical Office (2018) and National Consortium for the Study of Terrorism and Responses to Terrorism (START) (2018)

If an ARMAX model includes AR terms, the coefficients that determine the impacts on each period are calculated on the basis of the quotient of polynomials formed by the distributed lags and by the AR polynomial lags (Kuo *et al.* 2008). The coefficients that

determine the impacts of each period for the European markets' arrival series are presented in Table 37, with the significant coefficients in bold print.[31] For example, an additional terror victim in Western Europe in the current month increases German tourist arrivals in Switzerland five months later by approximately 0.01945%. The effect of one additional victim on German tourist arrivals in Switzerland is thus rather small.

Table 37: Results of calculated lag coefficients for European markets

Lag	Germany	UK	France	Italy
0	0.0000783	0.0000217	-0.0000098	-0.0000522
1	0.0000048	-0.0000458	0.0000082	-0.0000013
2	0.0000615	-0.0000762	-0.0000065	**-0.0001124**
3	0.0000927	0.0000013	**0.0001045**	**0.0000379**
4	0.0001224	0.0000363	**0.0002238**	-0.0000133
5	**0.0001945**	**0.0001220**	**0.0003796**	-0.0000267
6	0.0001625	**0.0001854**	**0.0004698**	0.0000002

Source: Own table

Table 38 presents the results of the simplified ARMAX models for estimating the impacts of terrorism in Western Europe on tourist arrivals in Switzerland for the distant source markets China, US, India, South Korea and Japan. For the source market of China, a negative effect of terrorism on tourist demand for Switzerland is found. An increase in terror victims in Western Europe leads to a negative effect on Chinese tourist arrivals in Switzerland two, three, four and five months later. For the source market of the US, however, the pattern resembles more the pattern of European source markets such as the UK, Germany or France. For the US market, with a lag of five months, terrorism has a positive effect on tourist arrivals at the 5% significance level. For the source market of India, I find an immediate negative effect on tourist arrivals in Switzerland, which takes place in the same month as well as with a lag of one month. One additional victim due to terrorism in Western Europe decreases Indian tourist arrivals in Switzerland in the same month by approximately 0.0122% and by approximately 0.0160% in the subsequent month (in comparison to the number of arrivals attested in the same months in the previous year). However, similar to Italy, I find a positive rebound effect four and five months later. An additional terrorism victim in the current period increases Indian tourist arrivals by around 0.0186% four months later and by around 0.0208% with a lag of five months. For the source market of South Korea, I find a negative impact of terrorism as well. The negative effect is visible immediately as well as with a lag of one month. The effects are statistically significant at the 5% level. For the arrivals of Japanese tourists, I find a statistically significant negative effect of terrorism, which takes effect with a lag

[31] Switzerland is not included because the terror variable and all its lags were insignificant.

of two months. However, similarly to India, five and six months later, I find a positive rebound effect.

Table 38: Estimates of ARMAX models for distant markets

	China	US	India	South Korea	Japan
	b/se	b/se	b/se	b/se	b/se
terror	-0.000164	0.000019	-0.000122**	-0.000287**	-0.000022
	(0.000177)	(0.000042)	(0.000059)	(0.000124)	(0.000089)
L.terror	-0.000294	-0.000024	-0.000160**	-0.000221**	-0.000145
	(0.000195)	(0.000052)	(0.000073)	(0.000107)	(0.000100)
L2.terror	-0.000576***	0.000071	0.000083		-0.000182**
	(0.000160)	(0.000052)	(0.000071)		(0.000075)
L3.terror	-0.000605***	0.000018	0.000018		-0.000065
	(0.000184)	(0.000049)	(0.000074)		(0.000076)
L4.terror	-0.000438**	-0.000072	0.000186**		0.000050
	(0.000171)	(0.000052)	(0.000094)		(0.000110)
L5.terror	-0.000402*	0.000104**	0.000208*		0.000233*
	(0.000243)	(0.000047)	(0.000107)		(0.000130)
L6.terror					0.000145*
					(0.000084)
constant	0.246102***	0.025991	0.088463***	0.119545***	-0.031113***
	(0.031326)	(0.019157)	(0.008925)	(0.038810)	(0.011459)
ARMA					
L.ar	0.361640***	0.503471***		0.958269***	0.355053***
	(0.114347)	(0.098270)		(0.027532)	(0.071658)
L2.ar	0.340665***	0.213046**			0.244775***
	(0.103815)	(0.089752)			(0.090536)
L3.ar		0.193557***			
		(0.073333)			
L.ma			0.558983***	-0.456805***	
			(0.089121)	(0.095287)	
L2.ma			0.313022***		
			(0.087082)		
L3.ma			0.341160***		
			(0.052079)		
ARMA12					
L.ar		-0.537834***			
		(0.099757)			
L2.ar		-0.453790***			
		(0.084951)			
L3.ar		-0.225927**			
		(0.094991)			
L.ma	-0.660321***		-0.688132***	-0.747746***	-0.647739***
	(0.102918)		(0.088435)	(0.079142)	(0.084346)
σ	0.186571***	0.045095***	0.092747***	0.134165***	0.102360***
	(0.017406)	(0.003106)	(0.006509)	(0.007204)	(0.006690)
N	144	144	144	144	144
AIC	-45.473827	-448.521270	-243.813071	-145.631046	-216.891238
BIC	-12.805881	-406.943884	-208.175311	-124.842353	-181.253478

Notes: The dependent variables are the seasonally differenced logarithmized number of arrivals
Source: Own table based on data from Federal Statistical Office (2018) and National Consortium for the Study of Terrorism and Responses to Terrorism (START) (2018)

Again, with the exception of the ARMAX model for India, which does not include any AR terms, the estimated coefficients cannot be directly interpreted regarding their magnitude. The coefficients that determine the impacts of terrorism in each period for the distant markets' arrival series are presented in Table 39, with the significant coefficients in bold print. For example, an additional terror victim in Western Europe in the current month decreases South Korean tourist arrivals in Switzerland in the same month by approximately 0.02875% and by approximately 0.04961% one month later.

Table 39: Results of calculated lag coefficients for distant markets

Lag	China	US	South Korea	Japan
0	-0.0001641	0.0000192	**-0.0002875**	-0.0000217
1	-0.0003531	-0.0000148	**-0.0004961**	-0.0001525
2	**-0.0007597**	0.0000676	-0.0004754	**-0.0002414**
3	**-0.0009998**	0.0000524	-0.0004556	-0.0001876
4	**-0.0010580**	-0.0000341	-0.0004366	-0.0000753
5	**-0.0011252**	**0.0001106**	-0.0004183	**0.0001604**
6	-0.0007673	0.0000586	-0.0004009	**0.0001837**

Source: Own table

3.4.3 Further analyses and robustness of results

Since depending on the source market, both negative and positive spillover effects have been found, it is of interest to establish how the Swiss tourism industry is overall affected by terrorism in Western Europe. Therefore, the analysis is repeated for total tourist arrivals in Switzerland. The analysis reveals no significant effect of terrorism in Western Europe on total tourist arrivals in Switzerland.[32] The lack of a significant overall effect can likely be explained by positive and negative spillover effects cancelling each other out.

The main analysis includes a large number of terrorist attacks with a small to medium number of casualties. It is likely that these attacks do not have the same influence on tourist arrivals as larger attacks. Still, due to the large number of these incidents, they might add noise to the data and conceal the true relationship between terrorism and tourist arrivals. Therefore, the analysis is repeated with a measure for the exogenous

[32] The results are presented in Appendix III: Further analyses and robustness tests

variable terrorism, which only considers the number of victims from large terrorist attacks with a minimum of 100 victims.[33] Again, the results are in line with those of the main analysis.[34] However, slight differences exist for the source markets of Italy and the US. Now, only a negative effect and no longer a recovery effect are observable for Italy, indicating that for severe attacks the negative effect prevails. Similarly, for the US, additionally to the positive effect, a slight first negative effect is observable. For the remaining source countries, the effects are very similar. Hence, overall, while including small-scale attacks does not seem to influence the results much, it becomes clear that the results are mainly driven by larger attacks.

The main analysis includes all terror attacks in Western Europe with at least one wounded person independently of whether the attacker is known or unknown and independently of the type of individual or terror organization that claimed responsibility for the attack. It might be argued that tourists are not affected by all types of terrorist attacks in the same way. Nationalist terrorist organizations e.g. often operate in a limited regional area, which might make the risk of an attack more predictable. In contrast, Islamist terrorism is not limited to a certain region. Similarly to Neumayer and Plümper (2016) who point out that attacks on Western tourists in Islamic countries affect Western tourists in comparable countries, it is likely, that tourists see Islamist terror in one Western country as a threat which concerns all Western countries, since the ideology behind Islamist terrorism is transnational, which leads to negative spillover effects. Woods (2011) finds that the danger of terrorism is perceived as higher when associated with radical Islamic groups. Furthermore, it is believed that some attacks do not receive as much media coverage as the Islamist terrorist attacks often widely covered by the media. For these reasons, as a robustness test, the analysis is repeated, this time only including the number of victims from terrorist incidents executed by attackers affiliated to Islamist terrorism. Interestingly, even though this analysis excludes a major terrorism incident by omitting the 2011 Norway attacks[35], the results are in line with the main results presented above.[36] Thus, while the results are not biased by the inclusion of all types of terrorist attacks, it might be concluded that the results are mainly driven by the number of victims caused by Islamist terrorist attacks.

[33] This leads to the inclusion of seven terrorist attacks: 2005 London bombings, 2011 Norway attacks, 2015 Paris attacks, 2016 Brussels bombings, 2016 Nice truck attack, 2017 Manchester Arena bombing and the 2017 Barcelona attacks.
[34] The results are presented in Appendix III: Further analyses and robustness tests.
[35] The attacks caused 152 victims, among them 77 fatalities.
[36] The results are presented in Appendix III: Further analyses and robustness tests.

Furthermore, it is sometimes argued that tourists' behavior is not primarily influenced by the number of actual victims of a terrorism incident, but rather by its perceived severity and the resulting perceived security level of a destination. This in turn is likely to be considerably influenced by the way and the frequency in which a terrorist incident is portrayed in the media (Wahlberg & Sjoberg 2000; Fielding & Shortland 2009). Therefore, as an additional robustness test, I measure the influence of media reporting about terrorism in Western Europe on tourist arrivals in Switzerland. The data is drawn from Factiva, a global news database owned by Dow Jones. Specifically, as a proxy for the intensity of media reporting, the number of reports on terrorism in Western Europe[37] by major global news agencies[38] per month for the years 2005-2017 is used. However, the results show no clear effect of the number of reports about terror in Western Europe on tourist arrivals in Switzerland. This at first glance rather surprising result can be explained by the fact that terrorism is a widely reported topic and the fact that the number of reports not only includes reports about executed terrorist attacks, but also reports about terrorism threats in general, arrests in connection with failed terrorist attacks, counter-terrorism policies etc. It is difficult to assess which of these reports will influence the behavior of tourists and should thus be included in the analysis. Despite their potentially unequal importance, each report counts equally. While there are clear spikes in times of major terrorism incidents visible in the data, there is still a lot of noise in the data. For this reason, additionally, the media analysis is executed only considering reports regarding the seven largest terrorism attacks in Western Europe during the time under consideration.[39] Now, the results are similar to the results of the main analysis. However, overall, the results are much less clear-cut. This might be explained by the fact that the amount of reports is only a rough proxy for the severity of the attack, while the number of victims is a much more precise measure. While there are on average more reports about attacks with a higher number of victims, the number of reports does not increase proportionately with the number of victims. It might be the case that reports about attacks with more victims are portrayed in a more negative way, however, this cannot be controlled for solely by the number of reports. Thus, the number of victims seems to be a more precise measure of terrorism. Additionally, the media coverage

[37] The database was scanned using the search term terror* for the region of Western and Northern Europe. The scan was restricted to the headline, so that only newswire reports focusing on relevant information were included in the analysis. Additionally, the scan was restricted to reports categorized in the category "terrorism".
[38] The search was limited to the three major global news agencies Agence France-Press (AFP), Associated Press Newswires (AP) and Reuters.
[39] See footnote 33

might be biased in a way that is not necessarily relevant for tourists. There is a striking number of reports about the 2017 Manchester Arena bombing, possibly because the attack followed a concert held by a famous American singer. Additionally, there were many minors among the victims. However, it could be argued that despite the extensive coverage of this attack, it is of less relevance for tourists, since Manchester is not a prime tourism destination.

Finally, it seems important to ensure that the results are indeed driven by spillover effects of terrorist attacks in Western Europe and not biased by direct effects of terrorist attacks that occurred in Switzerland during the period under consideration. Thus, as a robustness test, the results of the analysis including terrorist attacks in Switzerland and the results of the analysis excluding terrorist attacks in Switzerland are compared. During the time period under consideration, only two terrorist attacks with casualties took place in Switzerland, none of which were fatal.[40] Not surprisingly, the comparison shows that the results remain the same. Thus, it can be concluded that the results are indeed driven by spillover effects of terrorist attacks in the rest of Western Europe and not biased by terrorist incidents occurring in Switzerland at the same time.

3.5 Discussion

The results presented in the previous chapters show that terrorism in Western Europe has no effect on aggregate tourist arrivals in Switzerland. However, disaggregating tourist arrivals into source markets reveals significant spillover effects of terrorism in Western Europe on international tourist arrivals in Switzerland. This result is in line with previous studies (Bhattarai *et al.* 2005; Bassil 2014; Neumayer & Plümper 2016), and supports the hypothesis of the existence of spillover effects of terrorism on tourism. Similar to Drakos and Kutan (2003) as well as Bassil (2014), who find that the sign of the spillover effect depends on the specific country pair, my evidence indicates the presence of both positive and negative spillover effects. It is likely that these positive and negative effects cancel each other out and thus lead to no significant overall effect. While the few existing studies regarding spillover effects indicate that the sign of the effect depends on the specific country pair (Bassil 2014) and my results support this general hypothesis,

[40] In November 2007, a Muslim Swiss citizen opened fire in an Islamic center, where he wounded one person. In March 2011, a letter bomb of an unknown sender detonated at the office of Swissnuclear, injuring two persons.

I am able to identify broader patterns. Specifically, for most Western countries, I find a positive effect of terrorism in Western Europe on tourist arrivals in Switzerland. The substitution effect occurs with a lag of around three to six months. This makes sense, since tourists usually plan their vacation several months ahead. The only exception is Italy, which exhibits a slight negative effect, followed by a positive recovery effect in the next month. Interestingly, all of these countries - again with the exception of Italy - have suffered from fatal Islamist terrorist attacks in the past. Possibly, when confronted with terrorism in Western Europe, tourists from these countries are looking for a safe alternative in order to forget the atrocities of terrorism which occurred in their own country. Thus, they might see Switzerland as a safe haven. Since guests from Western source countries often travel individually, it is relatively easy for them to substitute towards other destinations.

In contrast, for the Asian markets, at least in the short run, a negative spillover effect is found. Thus, terrorism in Western Europe has a contagion effect on Asian tourist arrivals in Switzerland. The first negative effect appears relatively quickly, depending on the source market with a lag of only zero to two months. This indicates that tourists cancel or delay their travel plans at relatively short notice. This effect might be explained by the fact that many Asian tourists travel to Europe in organized group tours that include Switzerland as one of several European destinations. A terrorist attack in one of these destinations might lead to a cancellation of the full tour. Furthermore, it is possible that the tourists do not differentiate between security levels of different European countries. A terrorist attack might lead to the perception of Switzerland as a risky destination. Finally, even when differentiating between security levels and travelling individually, visiting Switzerland might not be the main motivation for tourists' trip to Europe, but an add-on in their Europe trip. A terrorist attack in a destination which is seen as a tour's main attraction might lead tourists to cancel the entire trip.

While the Asian source markets have a short-run negative effect in common, the patterns of the tourist arrivals differ after this first negative shock. While for some markets such as South Korea and in particular for China, the negative effects of terrorism persist over several months, for other markets, similarly to Italy, a rebound effect can be observed. For both the Indian and the Japanese source markets, three months after the disappearance of the negative effect, a positive rebound effect can be observed. This indicates that tourists from these markets are not completely deterred from travelling to Switzerland, however, they might delay their travel for several months. Interestingly, in contrast to the arrivals from Italy, where the rebound effect appears just one month after

the negative effect, tourists from Japan and India seem to delay their travel for a longer period of time. A reason for this observation might be that because of Italy's proximity, Italian tourists plan their travel at shorter notice and also, updated information about the security level is more widely available.

The analysis further reveals that terrorism in Western Europe has, in contrast to international tourist arrivals in Switzerland, no statistically significant effect on Swiss tourist arrivals in Switzerland. Thus, in light of increased terrorism in Western Europe, Swiss tourists do not increasingly go on vacations in their own country.

The results suggest that while terrorism in Western Europe has no effect on tourism demand for Switzerland overall, in the short run, it might lead to slight shifts within the guest structure from Asian tourists towards a higher number of tourists from Western source markets. However, it should be noted that, while statistically significant, the sizes of the spillover effects are relatively small. For most source markets, one additional terrorism victim in Western Europe has only a negligible impact on the number of tourist arrivals in Switzerland. In fact, the additional analyses and robustness tests show that the spillover effects are mostly driven by events with a large number of victims and with affiliation to Islamist terrorism. Thus, the evidence suggests that only terrorist attacks with a large number of victims - and among these primarily the ones related to Islamist terrorism - will influence the guest streams to Switzerland in an important way. The small size of the spillover effects might be explained by several factors. As the seasonal ARIMA models of tourist arrivals to Switzerland reveal, tourist arrivals are relatively persistent, meaning that current values of tourist arrivals tend to depend to a large extent on their past values. Furthermore, several authors have found that the negative consequences of terrorism are below-average in developed countries such as is the case for Western Europe (Blomberg *et al.* 2004; Tavares 2004; Llorca-Vivero 2008). The reason for this might be that more developed countries are perceived to be able to manage terrorism relatively well, for instance, because they tend to have well-developed and stable institutions. Thus, it is suggested that the negative effect of terrorism in the affected countries is below-average. As the results of Neumayer and Plümper (2016) indicate, spillover effects tend to be smaller than direct effects. Therefore, if the direct effects of terrorism in Western Europe are already suspected to be of limited extent, not surprisingly, the spillover effects to tourist arrivals in Switzerland will be even smaller. Furthermore, it should also be taken into account that the spillover effects are likely to be spread over several destinations and not just Switzerland.

Thus, terrorism in Western Europe has currently at best a small effect on tourist arrivals in Switzerland. This might also be explained by the fact that Western Europe is overall still seen as a relatively safe destination. However, an increased number of terror victims due to more frequent attacks might damage the image of Europe and lead to more direct negative effects and thus also increase the extent of spillover effects. As Pizam and Fleischer (2002) point out, while it is possible for a destination to recover even from severe terrorist attacks, a high frequency of terrorist attacks at regular intervals over a prolonged period of time might damage the tourism industry of a country permanently.

3.6 Conclusions and implications

This paper contributes and extends the literature on spatial spillover effects of terrorist attacks in the tourism industry. Specifically, in this paper, I examine the effect of terrorism in Western Europe on tourist arrivals in Switzerland. The main finding is that while total tourist arrivals in Switzerland are not affected by terrorism in Western Europe, terrorism in Western Europe leads to both positive and negative spatial spillover effects on tourist arrivals in Switzerland. The results indicate the importance of dividing total tourist arrivals into different categories in order to better identify the impact of terrorism on tourism. The evidence suggests that the spillover effects differ substantially between different source markets. The findings show, at least in the short run, a negative effect on tourist arrivals from the Asian source markets and a positive effect on tourist arrivals from the US and most European source markets.

These results have some practical implications for the destination marketing of Switzerland. Asian source markets are seen as important growth markets for the Swiss tourist industry. It is therefore recommended to try to prevent the negative spillover effects of terrorism in Western Europe on Asian tourist arrivals in Switzerland. A relatively large share of tourists from Asia travels in organized group tours that include Switzerland as one of several European destinations. A terrorist attack in one of these destinations which leads to a cancellation of the tour will thus affect Switzerland detrimentally. Hence, it might be worthwhile to promote independent travel among Asian tourists, for example by focusing on the increasing market of repeat visitors from Asia, which are more likely to travel independently. Additionally, it is recommended to make efforts to keep Western Europe a safe destination by keeping the security level high. In particular, severe attacks might damage the image of Western Europe permanently and lead to further negative

spillover effects. Since Switzerland cannot fully protect itself from the negative consequences of terrorism by only preventing attacks in its own territory, it might be recommendable to further cooperate trans-regionally in the prevention of terrorism. These findings and recommendations might also be of relevance for European countries similar to Switzerland which are also not directly affected by terrorism. Nonetheless, while the security of a destination is an important aspect for tourists, it should be kept in mind that the spillover effects are relatively small and explain tourist arrivals only to a very limited extent. Thus, it is crucial not to forget other aspects that contribute to a destination's success.

In terms of future research, several issues might be worth pursuing. Since spillover effects seem to be largely case specific, it could be the case that the effects differ between destinations. Thus, it might be worth carrying out studies for further destination countries in order to validate the findings of this study. Furthermore, the evidence indicates that it is mostly Islamist terrorism that leads to spillover effects. It is likely that tourists perceive the risk to become a victim of such terrorist attacks as higher than becoming a victim of another type of terrorist attack. It would be interesting to investigate in more detail which factors such as e.g. type of attackers, type and location of the target, portrayal in the media, but also characteristics of the tourists such as nationality, travel experience and personality traits, will actually lead to a terrorist attack influencing tourists' travel behavior.

Finally, it remains unclear whether the tourist arrivals from Asian source markets decrease mainly because tourists cancel Europe trips which include Switzerland as a reaction to terrorism, or whether tourists generally refrain from travelling to Europe, since they feel the entire destination, including Switzerland has become unsafe. Further research might shed light on this issue.

3.A Appendices to chapter 3

3.A.1 Appendix I: Tests and model identification

Table 40 to Table 50 depict the results of the Augmented Dickey-Fuller tests, which is run for all the time series. The Augmented Dickey-Fuller tests the null hypothesis that a unit root is present. For all tests the null hypothesis is rejected. For the time series of UK and US arrivals, the null hypothesis is rejected at the 5% significance level. For all other time series, the null hypothesis is even rejected at the 1% significance level. Thus, there is no unit root present in the time series.

Table 40: Augmented Dickey-Fuller test for unit root (Switzerland)

```
dfuller S12.ln_ArrivalsSwitzerland, lag(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =       143

                                 ---------- Interpolated Dickey-Fuller ---------
                    Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -7.438           -3.496            -2.887            -2.577
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

Source: Own table

Table 41: Augmented Dickey-Fuller test for unit root (Germany)

```
dfuller S12.ln_ArrivalsGermany, lag(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =       143

                                 ---------- Interpolated Dickey-Fuller ---------
                    Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -3.638           -3.496            -2.887            -2.577
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0051
```

Source: Own table

Table 42: Augmented Dickey-Fuller test for unit root (UK)

```
dfuller S12.ln_ArrivalsUK, lag(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =       143

                                 ---------- Interpolated Dickey-Fuller ---------
                    Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -3.026           -3.496            -2.887            -2.577
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0326
```

Source: Own table

Table 43: Augmented Dickey-Fuller test for unit root (France)

```
dfuller S12.ln_ArrivalsFrance, lag(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =       143

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -4.198           -3.496            -2.887            -2.577
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0007
```

Source: Own table

Table 44: Augmented Dickey-Fuller test for unit root (Italy)

```
dfuller S12.ln_ArrivalsItaly, lag(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =       143

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -5.021           -3.496            -2.887            -2.577
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

Source: Own table

Table 45: Augmented Dickey-Fuller test for unit root (China)

```
dfuller S12.ln_ArrivalsChina, lag(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =       143

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -4.327           -3.496            -2.887            -2.577
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0004
```

Source: Own table

Table 46: Augmented Dickey-Fuller test for unit root (US)

```
dfuller S12.ln_ArrivalsUS, lag(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =       143

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -3.330           -3.496            -2.887            -2.577
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0136
```

Source: Own table

Table 47: Augmented Dickey-Fuller test for unit root (India)

```
dfuller S12.ln_ArrivalsIndia, lag(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =       143

                                ---------- Interpolated Dickey-Fuller ---------
                   Test         1% Critical       5% Critical      10% Critical
                 Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -4.935            -3.496            -2.887            -2.577
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

Source: Own table

Table 48: Augmented Dickey-Fuller test for unit root (South Korea)

```
dfuller S12.ln_ArrivalsKorea, lag(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =       143

                                ---------- Interpolated Dickey-Fuller ---------
                   Test         1% Critical       5% Critical      10% Critical
                 Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -3.678            -3.496            -2.887            -2.577
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0044
```

Source: Own table

Table 49: Augmented Dickey-Fuller test for unit root (Japan)

```
dfuller S12.ln_ArrivalsJapan, lag(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =       143

                                ---------- Interpolated Dickey-Fuller ---------
                   Test         1% Critical       5% Critical      10% Critical
                 Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -4.682            -3.496            -2.887            -2.577
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0001
```

Source: Own table

Table 50: Augmented Dickey-Fuller test for unit root (terrorism)

```
dfuller nvictims, lag(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =       154

                                ---------- Interpolated Dickey-Fuller ---------
                   Test         1% Critical       5% Critical      10% Critical
                 Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -8.149            -3.492            -2.886            -2.576
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

Source: Own table

Table 51 to Table 60 present the results of the Portmanteau (Q) test for white noise for the best fitted seasonal ARMA models. The test results show that there is no serial correlation, thus I conclude that the residuals of the models are white noise.

Table 51: Portmanteau (Q) test for white noise (Switzerland)

```
wntestq resid_m1, lags(10)

Portmanteau test for white noise
--------------------------------------
 Portmanteau (Q) statistic =    15.1728
 Prob > chi2(10)           =     0.1259
```

Source: Own table

Table 52: Portmanteau (Q) test for white noise (Germany)

```
wntestq resid_m2, lags(10)

Portmanteau test for white noise
--------------------------------------
 Portmanteau (Q) statistic =     5.5769
 Prob > chi2(10)           =     0.8495
```

Source: Own table

Table 53: Portmanteau (Q) test for white noise (UK)

```
wntestq resid_m3, lags(10)

Portmanteau test for white noise
--------------------------------------
 Portmanteau (Q) statistic =     7.8345
 Prob > chi2(10)           =     0.6450
```

Source: Own table

Table 54: Portmanteau (Q) test for white noise (France)

```
wntestq resid_m4, lags(10)

Portmanteau test for white noise
--------------------------------------
 Portmanteau (Q) statistic =     5.5868
 Prob > chi2(10)           =     0.8487
```

Source: Own table

Table 55: Portmanteau (Q) test for white noise (Italy)

```
wntestq resid_m5, lags(10)

Portmanteau test for white noise
--------------------------------------
 Portmanteau (Q) statistic =    10.5756
 Prob > chi2(10)           =     0.3915
```

Source: Own table

Table 56: Portmanteau (Q) test for white noise (China)

```
wntestq resid_m6, lags(10)

Portmanteau test for white noise
--------------------------------------
 Portmanteau (Q) statistic =     7.1695
 Prob > chi2(10)           =     0.7094
```

Source: Own table

Table 57: Portmanteau (Q) test for white noise (US)

```
wntestq resid_m7, lags(10)

Portmanteau test for white noise
--------------------------------------
 Portmanteau (Q) statistic =    12.0789
 Prob > chi2(10)           =     0.2798
```

Source: Own table

Table 58: Portmanteau (Q) test for white noise (India)

```
wntestq resid_m8, lags(10)

Portmanteau test for white noise
--------------------------------------
 Portmanteau (Q) statistic =    11.9305
 Prob > chi2(10)           =     0.2897
```

Source: Own table

Table 59: Portmanteau (Q) test for white noise (South Korea)

```
wntestq resid_m9, lags(10)

Portmanteau test for white noise
--------------------------------------
 Portmanteau (Q) statistic =     4.2655
 Prob > chi2(10)           =     0.9346
```

Source: Own table

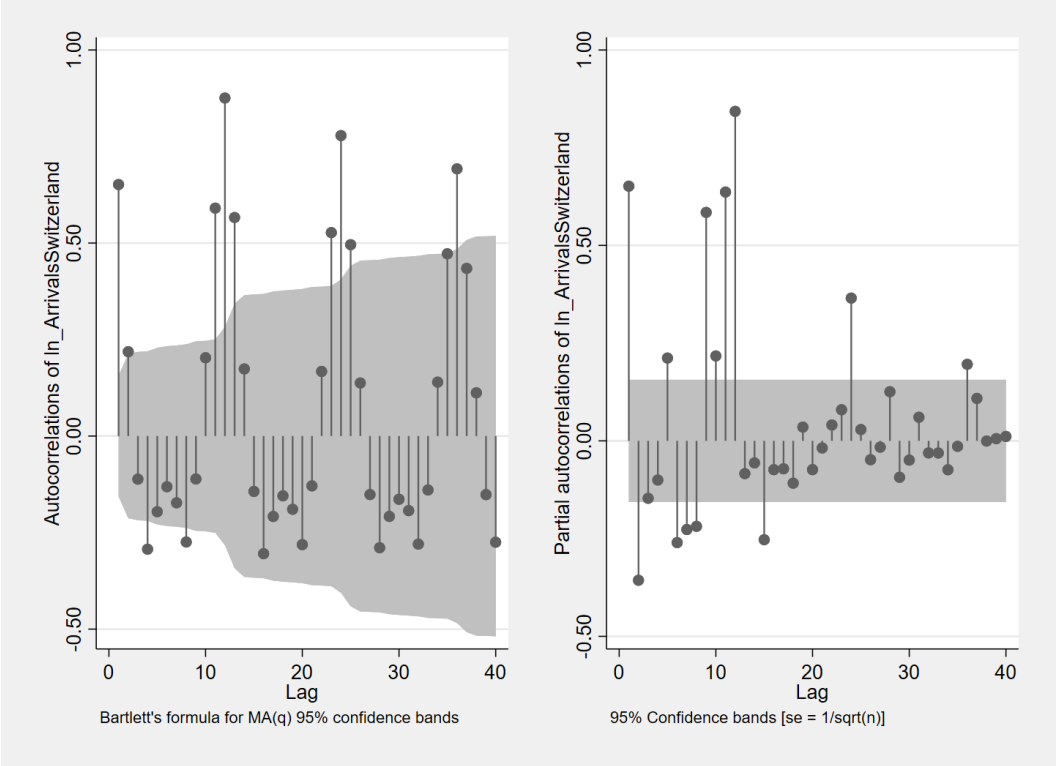
Table 60: Portmanteau (Q) test for white noise (Japan)

```
wntestq resid_m10, lags(10)

Portmanteau test for white noise
--------------------------------------
 Portmanteau (Q) statistic =     6.4122
 Prob > chi2(10)           =     0.7795
```

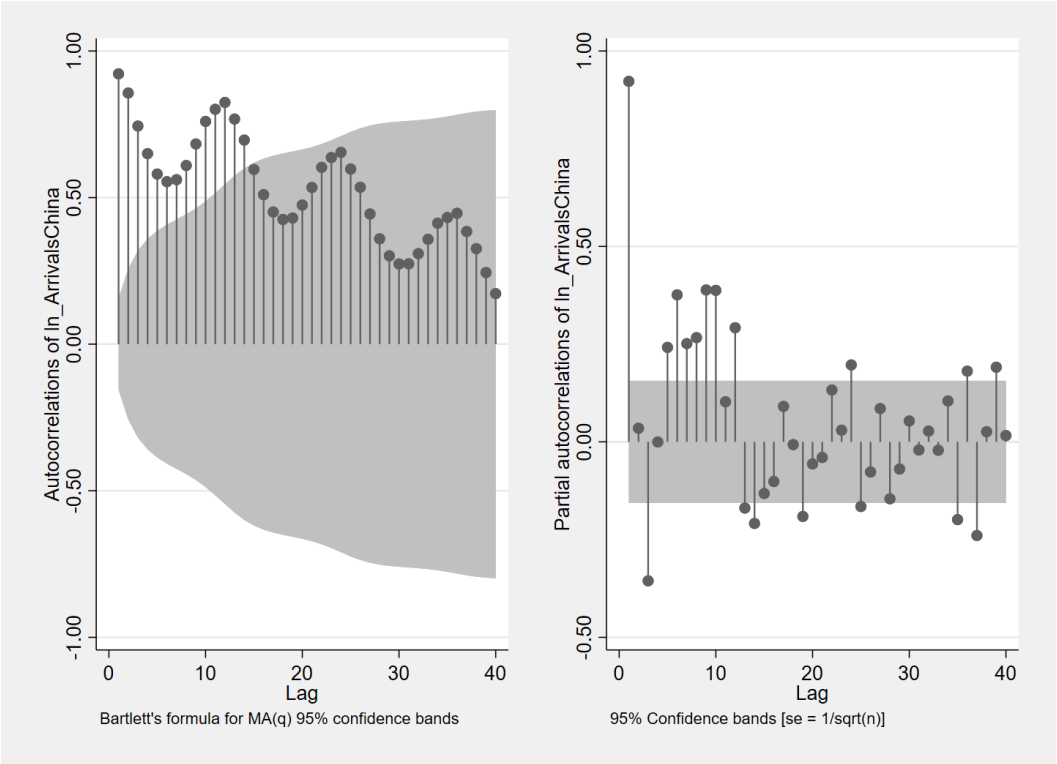
Source: Own table

Table 61: ACF and PACF of logarithmized arrival time series (Switzerland)



Source: Own table

Table 62: ACF and PACF of logarithmized arrival time series (China)



Source: Own table

3.A.2 Appendix II: Initial ARMAX models

Table 63: Initial ARMAX models European markets

	Switzerland	Germany	UK	France	Italy
	b/se	b/se	b/se	b/se	b/se
terror	-0.00000	0.00008	0.00002	-0.00001	-0.00007*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L.terror	0.00000	-0.00004	-0.00005	0.00002	0.00002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L2.terror	0.00000	0.00003	-0.00007	-0.00001	-0.00009**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L3.terror	0.00002	0.00006	0.00005	0.00011***	0.00008*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L4.terror	0.00004	0.00004	0.00008	0.00012***	0.00004
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L5.terror	0.00005	0.00009*	0.00011**	0.00016***	-0.00001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L6.terror	0.00000	0.00000	0.00012***	0.00010***	-0.00003
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
constant	0.01861***	-0.01161	-0.00780	0.00937	0.00566
	(0.003)	(0.033)	(0.015)	(0.015)	(0.015)
ARMA					
L.ar	1.84560***	0.60884***	0.35428***	0.97923***	0.27859***
	(0.044)	(0.117)	(0.080)	(0.021)	(0.082)
L2.ar	-0.91566***	0.35895***	0.51966***		0.20518**
	(0.046)	(0.108)	(0.081)		(0.086)
L3.ar					0.28291***
					(0.097)
L.ma	-1.88845***	-0.50767***		-0.68119***	
	(0.006)	(0.104)		(0.072)	
L2.ma	1.00000***				
	(0.000)				
ARMA12					
L.ar	-0.42632***	-0.56538***		0.52691***	
	(0.090)	(0.086)		(0.096)	
L2.ar	-0.32725***	-0.29371***			
	(0.095)	(0.109)			
L3.ar	-0.30233***				
	(0.096)				
L.ma			-0.64831***	-0.99998***	-0.41802***
			(0.148)	(0.001)	(0.122)
σ	0.03398***	0.04912***	0.04931***	0.03994***	0.05985***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
N	144	144	144	144	144
AIC	-522.15114	-425.57548	-426.70352	-474.14748	-373.41537
BIC	-474.63413	-383.99809	-391.06576	-435.53990	-334.80780

Notes: The dependent variable is the seasonally differenced logarithmized number of arrivals
Source: Own table

Table 64: Initial ARMAX models distant markets

	China	US	India	South Korea	Japan
	b/se	b/se	b/se	b/se	b/se
terror	-0.00016	0.00000	-0.00012**	-0.00024	-0.00002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L.terror	-0.00030	-0.00004	-0.00016**	-0.00025	-0.00014
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L2.terror	-0.00061***	0.00007	0.00008	-0.00011	-0.00018**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L3.terror	-0.00058***	-0.00002	0.00002	-0.00003	-0.00006
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L4.terror	-0.00041**	-0.00009*	0.00019*	-0.00013	0.00005
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L5.terror	-0.00037	0.00007	0.00021*	-0.00005	0.00023*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L6.terror	0.00009	-0.00006	0.00001	0.00002	0.00015*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
constant	0.24234***	0.03218	0.08832***	0.12637***	-0.03111***
	(0.034)	(0.023)	(0.009)	(0.046)	(0.011)
ARMA					
L.ar	0.36641***	0.50069***		0.96174***	0.35505***
	(0.110)	(0.096)		(0.028)	(0.072)
L2.ar	0.34079***	0.23457**			0.24477***
	(0.104)	(0.092)			(0.091)
L3.ar		0.18611***			
		(0.070)			
L.ma			0.55932***	-0.46440***	
			(0.090)	(0.097)	
L2.ma			0.31463***		
			(0.094)		
L3.ma			0.34099***		
			(0.052)		
ARMA12					
L.ar		-0.53244***			
		(0.102)			
L2.ar		-0.45555***			
		(0.087)			
L3.ar		-0.22769**			
		(0.092)			
L.ma	-0.65349***		-0.68864***	-0.72949***	-0.64774***
	(0.104)		(0.089)	(0.081)	(0.084)
σ	0.18649***	0.04479***	0.09274***	0.13414***	0.10236***
	(0.017)	(0.003)	(0.007)	(0.007)	(0.007)
N	144	144	144	144	144
AIC	-43.78016	-448.37737	-241.82014	-136.37467	-216.89124
BIC	-8.14240	-403.83017	-203.21257	-100.73691	-181.25348

Notes: The dependent variable is the seasonally differenced logarithmized number of arrivals
Source: Own table

3.A.3 Appendix III: Further analyses and robustness tests

Table 65 presents the results of the initial as well as the simplified ARMAX model for total tourist arrivals. The models build on a previously best fitted seasonal ARMA model.[41]

Table 65: Initial and simplified ARMAX model total arrivals

	Total arrivals b/se	**Total arrivals** b/se
terror	-0.00001	
	(0.00002)	
L.terror	-0.00005*	
	(0.00003)	
L2.terror	-0.00003	
	(0.00004)	
L3.terror	-0.00001	
	(0.00003)	
L4.terror	0.00000	
	(0.00002)	
L5.terror	0.00005	
	(0.00004)	
L6.terror	0.00001	
	(0.00003)	
constant	0.02142***	0.02096***
	(0.00661)	(0.00420)
ARMA		
L.ar	1.82119***	1.82617***
	(0.09099)	(0.09797)
L2.ar	-0.85120***	-0.85872***
	(0.09794)	(0.09354)
L.ma	-1.65838***	-1.69213***
	(0.12208)	(0.09168)
L2.ma	0.76795***	0.80624***
	(0.12691)	(0.07685)
ARMA12		
L.ma	-0.61941***	-0.59999***
	(0.10871)	(0.09471)
sigma		
σ	0.02896***	0.02928***
	(0.00176)	(0.00171)
N	144	145
AIC	-576.18737	-591.48759
BIC	-534.60998	-570.65046

Notes: The dependent variable is the seasonally differenced logarithmized number of total arrivals
Source: Own table

[41] It has been confirmed that there is no unit root present in the time series and the residuals of all the models are white noise.

Table 66 and Table 67 present the results of the simplified ARMAX models for the effect of Islamist terrorism in Western Europe on European and distant markets' tourist arrivals, respectively.[42]

Table 66: Simplified ARMAX models European markets (Islamist terrorism)

	Switzerland b/se	**Germany** b/se	**UK** b/se	**France** b/se	**Italy** b/se
terror		0.000115*	0.000034	-0.000003	-0.000049
		(0.000069)	(0.000067)	(0.000040)	(0.000035)
L.terror		-0.000050	-0.000056	0.000057**	0.000058
		(0.000031)	(0.000040)	(0.000024)	(0.000037)
L2.terror		0.000044	-0.000086	-0.000004	-0.000089**
		(0.000039)	(0.000060)	(0.000028)	(0.000045)
L3.terror		0.000066	0.000036	0.000147***	0.000088*
		(0.000051)	(0.000052)	(0.000037)	(0.000046)
L4.terror		-0.000006	0.000028	0.000120***	
		(0.000050)	(0.000051)	(0.000045)	
L5.terror		0.000114**	0.000097	0.000123***	
		(0.000049)	(0.000060)	(0.000027)	
L6.terror			0.000130***	0.000093***	
			(0.000041)	(0.000030)	
constant	0.021112***	-0.009354	-0.004908	0.012956	0.004073
	(0.003033)	(0.030640)	(0.014411)	(0.019078)	(0.013355)
ARMA					
L.ar	1.801235***	0.614880***	0.354381***	0.975974***	0.290341***
	(0.122060)	(0.117250)	(0.080351)	(0.021332)	(0.083315)
L2.ar	-0.856355***	0.353324***	0.515918***		0.196739**
	(0.149586)	(0.109746)	(0.081900)		(0.086093)
L3.ar					0.277915***
					(0.090379)
L.ma	-1.777514***	-0.508972***		-0.672365***	
	(0.188677)	(0.103457)		(0.076106)	
L2.ma	0.876666***				
	(0.218252)				
ARMA12					
L.ar	-0.417471***	-0.566684***		0.432915**	
	(0.091113)	(0.087580)		(0.199975)	
L2.ar	-0.290040***	-0.294662***			
	(0.094556)	(0.109320)			
L3.ar	-0.284370***				
	(0.099430)				
L.ma			-0.643558***	-0.788739***	-0.435223***
			(0.159696)	(0.198713)	(0.116591)
σ	0.034866***	0.049138***	0.049626***	0.042253***	0.059877***
	(0.002188)	(0.003164)	(0.003039)	(0.003966)	(0.003706)
N	145	144	144	144	144
AIC	-538.009629	-427.465421	-424.991266	-471.956312	-379.113309
BIC	-511.219025	-388.857848	-389.353507	-433.348739	-349.415176

Notes: The dependent variable is the seasonally differenced logarithmized number of arrivals
Source: Own table

[42] The residuals of all the models are white noise.

Table 67: Simplified ARMAX models distant markets (Islamist terrorism)

	China	US	India	South Korea	Japan
	b/se	b/se	b/se	b/se	b/se
terror	-0.000417***	0.000036	-0.000161***		-0.000109
	(0.000082)	(0.000057)	(0.000057)		(0.000071)
L.terror	-0.000719***	-0.000029	-0.000151*		-0.000244***
	(0.000132)	(0.000057)	(0.000078)		(0.000092)
L2.terror	-0.000621***	0.000076	0.000103		-0.000127
	(0.000183)	(0.000061)	(0.000081)		(0.000083)
L3.terror	-0.000695***	0.000032	0.000014		-0.000111
	(0.000165)	(0.000058)	(0.000078)		(0.000072)
L4.terror	-0.000274**	-0.000087	0.000256**		0.000090
	(0.000109)	(0.000053)	(0.000101)		(0.000110)
L5.terror		0.000103**	0.000236*		0.000298**
		(0.000049)	(0.000121)		(0.000142)
constant	0.230915***	0.026761	0.089036***	0.104798***	-0.027280**
	(0.026766)	(0.018542)	(0.007696)	(0.038384)	(0.010972)
ARMA					
L.ar	0.337485***	0.501672***		0.940229***	0.345590***
	(0.112391)	(0.097818)		(0.032917)	(0.073478)
L2.ar	0.353012***	0.211019**			0.267360***
	(0.099802)	(0.090416)			(0.088740)
L3.ar		0.196219***			
		(0.073845)			
L.ma			0.554847***	-0.437833***	
			(0.088229)	(0.098290)	
L2.ma			0.302116***		
			(0.087136)		
L3.ma			0.338002***		
			(0.054666)		
ARMA12					
L.ar		-0.525304***			
		(0.098740)			
L2.ar		-0.446658***			
		(0.084303)			
L3.ar		-0.223800**			
		(0.092332)			
L.ma	-0.645433***		-0.694256***	-0.650176***	-0.622293***
	(0.085695)		(0.082592)	(0.058965)	(0.084264)
σ	0.186106***	0.045135***	0.092392***	0.137870***	0.102621***
	(0.017002)	(0.003088)	(0.006505)	(0.007568)	(0.006977)
N	144	144	144	145	144
AIC	-48.618574	-448.425851	-244.718224	-145.971933	-218.787456
BIC	-18.920441	-406.848464	-209.080465	-131.088264	-186.119509

Notes: The dependent variable is the seasonally differenced logarithmized number of arrivals
Source: Own table

Table 68 and Table 69 present the results of the simplified ARMAX models for the effect of victims from large-scale terrorism incidents (at least 100 victims) in Western Europe on European and distant markets' tourist arrivals, respectively.[43]

Table 68: Simplified ARMAX models European markets (large-scale events only)

	Switzerland b/se	**Germany** b/se	**UK** b/se	**France** b/se	**Italy** b/se
terror		0.000077	0.000015	-0.000035	-0.000116***
		(0.000083)	(0.000068)	(0.000030)	(0.000037)
L.terror		-0.000066	-0.000061	0.000016	-0.000022
		(0.000046)	(0.000044)	(0.000040)	(0.000047)
L2.terror		0.000038	-0.000066	-0.000014	-0.000145***
		(0.000047)	(0.000069)	(0.000032)	(0.000042)
L3.terror		0.000049	0.000050	0.000128***	
		(0.000055)	(0.000057)	(0.000040)	
L4.terror		0.000033	0.000069	0.000136***	
		(0.000052)	(0.000059)	(0.000051)	
L5.terror		0.000110**	0.000117**	0.000159***	
		(0.000053)	(0.000057)	(0.000046)	
L6.terror			0.000116***	0.000095***	
			(0.000039)	(0.000035)	
constant	0.021009***	-0.008215	-0.004977	0.014177	0.007303
	(0.003028)	(0.030477)	(0.014886)	(0.016491)	(0.012520)
ARMA					
L.ar	1.803298***	0.615492***	0.356002***	0.975616***	0.288148***
	(0.129817)	(0.117084)	(0.079960)	(0.020743)	(0.081700)
L2.ar	-0.859057***	0.352136***	0.516992***		0.202638**
	(0.157960)	(0.109951)	(0.081311)		(0.086853)
L3.ar					0.266769***
					(0.089896)
L.ma	-1.780203***	-0.505973***		-0.672997***	
	(0.198011)	(0.101759)		(0.072380)	
L2.ma	0.879353***				
	(0.226028)				
ARMA12					
L.ar	-0.418334***	-0.565224***		0.452054**	
	(0.090986)	(0.085209)		(0.227449)	
L2.ar	-0.290119***	-0.296834***			
	(0.095093)	(0.107687)			
L3.ar	-0.284984***				
	(0.098896)				
L.ma			-0.639939***	-0.861337***	-0.442267***
			(0.153121)	(0.289911)	(0.120470)
σ	0.034969***	0.049125***	0.049699***	0.041505***	0.060026***
	(0.002191)	(0.003128)	(0.003020)	(0.004480)	(0.003688)
N	144	144	144	144	144
AIC	-533.261947	-427.505907	-424.662477	-474.449650	-380.307023
BIC	-506.533627	-388.898334	-389.024718	-435.842077	-353.578703

Notes: The dependent variable is the seasonally differenced logarithmized number of arrivals
Source: Own table

[43] The residuals of all the models are white noise.

Table 69: Simplified ARMAX models distant markets (large-scale events only)

	China	US	India	South Korea	Japan
	b/se	b/se	b/se	b/se	b/se
terror	-0.000183	0.000015	-0.000144**	-0.000270**	-0.000054
	(0.000189)	(0.000045)	(0.000068)	(0.000116)	(0.000085)
L.terror	-0.000575***	-0.000042	-0.000172**	-0.000249**	-0.000183*
	(0.000188)	(0.000058)	(0.000083)	(0.000110)	(0.000108)
L2.terror	-0.000528***	0.000042	0.000074		-0.000242***
	(0.000202)	(0.000064)	(0.000093)		(0.000089)
L3.terror	-0.000584***	0.000005	0.000011		-0.000101
	(0.000199)	(0.000057)	(0.000089)		(0.000084)
L4.terror	-0.000384**	-0.000091*	0.000201*		0.000033
	(0.000174)	(0.000055)	(0.000106)		(0.000121)
L5.terror		0.000100*	0.000215*		0.000230*
		(0.000054)	(0.000118)		(0.000137)
L6.terror					0.000151*
					(0.000085)
constant	0.222345***	0.028579	0.090238***	0.115453***	-0.029092***
	(0.030485)	(0.019507)	(0.008038)	(0.038621)	(0.010208)
ARMA					
L.ar	0.348558***	0.508394***		0.956989***	0.352420***
	(0.111717)	(0.098922)		(0.027715)	(0.071237)
L2.ar	0.374480***	0.200513**			0.245877***
	(0.094383)	(0.092030)			(0.090296)
L3.ar		0.207759***			
		(0.074641)			
L.ma			0.559689***	-0.457401***	
			(0.089419)	(0.094368)	
L2.ma			0.316056***		
			(0.087025)		
L3.ma			0.338738***		
			(0.052552)		
ARMA12					
L.ar		-0.540151***			
		(0.098707)			
L2.ar		-0.456029***			
		(0.084926)			
L3.ar		-0.218875**			
		(0.095386)			
L.ma	-0.621024***		-0.694908***	-0.739405***	-0.648197***
	(0.088960)		(0.089207)	(0.074892)	(0.085768)
σ	0.188779***	0.045089***	0.092787***	0.134230***	0.102206***
	(0.017526)	(0.003095)	(0.006451)	(0.007110)	(0.006622)
N	144	144	144	144	144
AIC	-45.074578	-448.564258	-243.468441	-145.805085	-217.313221
BIC	-15.376445	-406.986872	-207.830682	-125.016391	-181.675462

Notes: The dependent variable is the seasonally differenced logarithmized number of arrivals
Source: Own table

4 Exchange rate risk management in the Swiss hotel industry: A conceptual framework and multiple case study analysis[44]

4.1 Introduction

For almost a decade, the Swiss franc (CHF) has generally been appreciating against most major currencies, especially against the euro. From the fall of 2008, when the financial crisis was at its peak, until the fall of 2011, the CHF appreciated by almost 40% against the euro. In the wake of this tremendous appreciation, the Swiss National Bank decided to introduce an exchange rate floor of CHF 1.20 per euro on September 6, 2011. The Bank defended this exchange rate until January 15, 2015, when it unpegged the CHF. This led to a strong shock, with the exchange rate temporarily reaching values below parity. For the time being, the exchange rate floats around CHF 1.15 per euro. The appreciation of the Swiss franc presents a major challenge to the tourism sector, which is one of Switzerland's largest export industries (Ferro Luzzi & Flückiger 2003) and an important job provider, particularly in rural areas. The exchange rate is a key determinant of a destination's price competitiveness, which is of paramount importance to its performance (Dwyer *et al.* 2000; Mangion *et al.* 2005). Thus, the appreciation of the Swiss franc led to a substantial decline in the price competitiveness of the mostly location-bound tourism sector. Swiss tourist services became more expensive for visitors from the euro area, whereas tourism services in the euro area became more economical for Swiss outgoing tourists. This situation is problematic because these source markets account for the majority of tourists in Switzerland. Additionally, the sector is confronted with relatively high exchange rate volatility, which leads to uncertainty about cash flows.

Exchange rate risk exposure and management are not new topics, as evidenced by the wealth of studies that address these issues for large, listed and often multinational companies (e.g. Bodnar & Gentry 1993; Marshall 2000; Allayannis *et al.* 2001; Allayannis & Ofek 2001; Pantzalis *et al.* 2001; Pramborg 2005; Dominguez & Tesar 2006; Döhring 2008; Bartram *et al.* 2010; Ito *et al.* 2016). However, a very limited number of studies have addressed exchange rate risk exposure or management of large listed companies in the tourism industry. Bodnar and Gentry (1993) analyze industry-level exchange rate

[44] Notes on this chapter:
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exposure for different industries. For the hotel industry in general, they do not find significant exchange rate exposure, and they conclude that positive and negative exposure within an industry might cancel each other out or that exposure might have been reduced by hedging. Lee and Jang (2010), on the other hand, explore the impact of internationalization on exchange rate risk exposure for hotels and gaming firms and find significant exchange rate exposures for both international and domestic firms. In fact, the percentage of domestic firms that is exposed to exchange rate risks is even higher than that of international firms. The authors suggest that this might be the case because international firms make use of operational hedging through international diversification. In a later study, Lee and Jang (2011) again find that the majority of a sample of 18 US tourism-related listed companies have significant exchange rate exposure. Therefore, they suspect that several of these companies do not hedge, but they do not further investigate the use of hedging. The only study focused on hedging is that of Singh and Upneja (2007), which investigates the use of derivatives. They find that only a few of the examined listed firms from the US lodging industry use derivatives to reduce their exchange rate exposure.

However, in Switzerland, as well as in many other countries, the hotel industry is small-scaled (Buhalis & Peters 2006). The large majority of hotels are non-listed, domestic firms; thus, they are often small. Due to differences in company structures, it cannot be assumed that the exchange rate risk management of large listed companies can be directly transferred to these small touristic firms. Therefore, this paper aims to contribute to the literature by focusing on the exchange rate exposure and risk management of small- and medium-sized touristic firms.

Specifically, this paper seeks to develop a conceptual framework describing the factors that influence the exchange rate exposure of hotels, one of which is the use of exchange rate risk management. This paper aims to investigate the exchange rate risk management instruments available to hotels and the extent to which hotels already make use of these; it also seeks to gain insight into hotels' exchange rate risk management practices. Additionally, it aims to reveal any unused potential for exchange rate risk management in the hotel industry, which might also be relevant to small- and medium-sized touristic firms in other countries that are similarly affected by exchange rate movements.

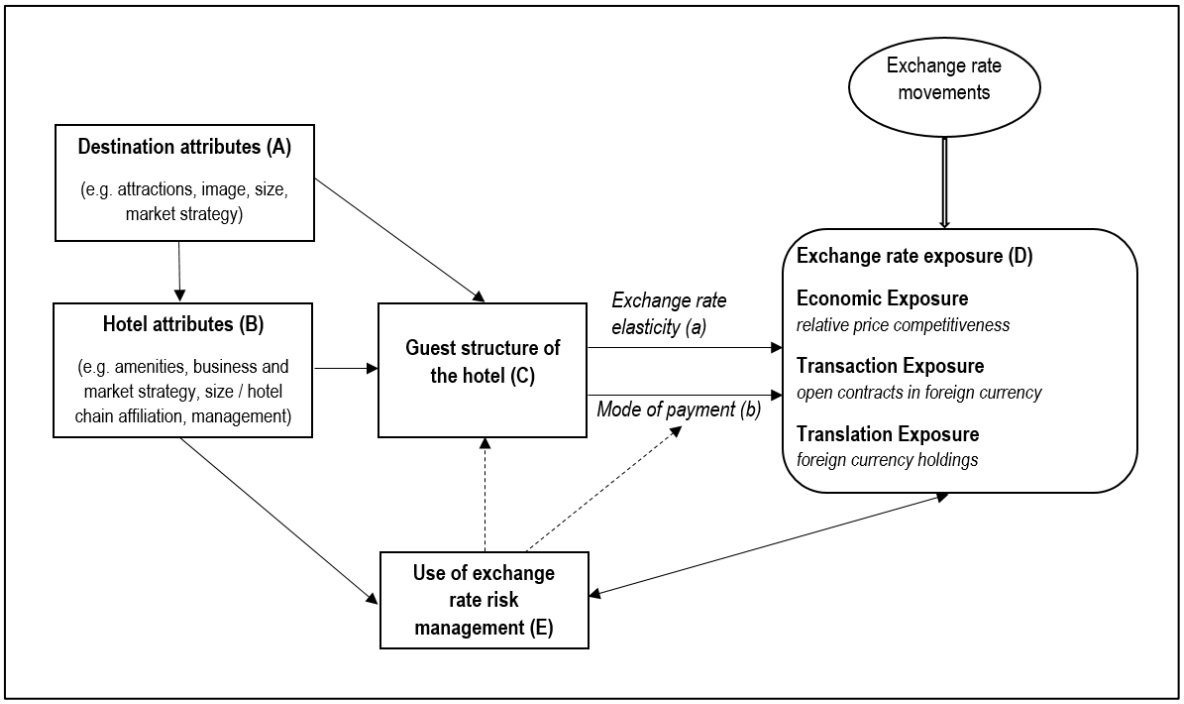
The remainder of this chapter is organized as follows. Section 2 develops a conceptual framework explaining the context of exchange rate risk exposure and management in the hotel industry. Section 3 reviews the methodology used to conduct the research.

Section 4 presents the results. Section 5 discusses the results and puts them into context. Finally, section 6 concludes.

4.2 Conceptual framework of exchange rate exposure and management

Figure 3 presents a conceptual framework that identifies factors influencing the exchange rate exposure of a hotel. The aim of the conceptual framework is to depict the mechanisms and factors that lead to a hotel's exchange rate exposure and the role that exchange rate risk management plays in reducing that exposure.

Figure 3: Conceptual framework of the factors influencing a hotel's exchange rate exposure



Source: Own figure

The conceptual framework encompasses the following key elements: destination attributes (A), hotel attributes (B), guest structure of the hotel (C), exchange rate exposure (D) and exchange rate risk management (E). The exchange rate risk exposure and management of a hotel can only be understood by considering the relations between these elements.

Destination attributes (A)

Destination attributes (A) influence both the attributes of a hotel (B) as well as its guest structure (C). Destination attributes include a destination's attractions, image, infrastructure, size, location and market strategy, which largely determine the attributes of a hotel (relation AB). Depending on the type of destination, different types of hotels will be prevalent. For example, a large urban business hub with access to an international airport is more likely to have large business hotels with amenities relevant to business tourists than a small rural destination. Conversely, a destination in an alpine area famous for its skiing will have hotels catering to the interests of winter sport guests. Consequently, the business and marketing strategies of hotels will differ depending on their destination.
Furthermore, the destination directly influences the guest structure of its hotels (relation AC). As Cizmar and Weber (2000) note, the choice of destination remains one of the first and most important decisions made by tourists. In most cases, guests first choose their destination and then, in a second decision, a specific hotel. The attributes of a destination, such as its touristic attractions, image, infrastructure, location and market strategy, thus determine whether it will be chosen by tourists (Dwyer & Kim 2003; Enright & Newton 2005; Gooroochurn & Sugiyarto 2005; Bahar & Kozak 2007). Those attributes vary in importance across different target markets and the types of guests they attract (Enright & Newton 2005; Falk 2013).

Hotel attributes (B)

While the guest structure is largely determined by the characteristics of the destination, the specific attributes of a hotel, such as its amenities, business or market strategy, influence its guest structure at least partially (relation BC) (Lockyer 2005; Yavas & Babakus 2005) because different attributes are relevant to different guest groups. The importance that tourists attach to individual hotel attributes is significantly influenced by their travel motive – such as business or leisure (Yavas & Babakus 2005) – as well as by their source market (Mccleary *et al.* 1998; Gilbert & Tsao 2000).
Some hotel attributes, such as size, hotel chain affiliation, type of management and its strategies (Kim & Sung 2005; Döhring 2008; Ito *et al.* 2016) further influence the use of exchange rate risk management (relation BE). Due to economies of scale, there might be a positive relationship between firm size or hotel chain affiliation and the use of exchange rate risk management (Kim & Sung 2005; Singh & Upneja 2007). As in small- and medium-sized firms, such as Swiss hotels, managers hold extensive power, their

personal values and characteristics are likely to influence the hotel's organizational and strategic behavior (Legohérel *et al.* 2004; Pennings & Garcia 2004; Herrmann & Datta 2005). Depending on the manager's risk attitudes and risk perceptions the hotel's risk taking behavior and risk management practices differ (Pennings & Smidts 2000). Additionally, the hotel's behavior is influenced by the manager's experiences and skills, which in turn are positively related to the use of exchange rate risk management (Herrmann & Datta 2005). An important differentiation that might be relevant to understand hotel managers' exchange rate risk management practices, is the one between risk and uncertainty. The literature provides many discussions on risks and uncertainty, but only few definitions and often, the two terms are used interchangeably (Holton 2004). However, Knight (2012) argues that risk and uncertainty are categorically different. He suggests that risk describes measurable or known uncertainty while real uncertainty describes unmeasurable or unknown uncertainty. Thus, risk relates to objective probabilities, while uncertainty relates to subjective probabilities. If managers are not aware of the risks they face, but only have a vague idea about them, and thus are confronted with uncertainty, it is difficult to implement a proper exchange rate risk management. In these cases, it is expected that the hotel managers will only react to the consequences of changes in exchange rates, rather than proactively manage exchange rate risks.[45]

Guest structure of the hotel (C)

The guest structure of a hotel is a key factor in understanding its exchange rate exposure. It affects the hotel's exposure through two channels. The first channel is the exchange rate elasticity, which primarily affects the hotel's economic exposure (relation C-a-D). Economic exposure describes changes in price competitiveness relative to competitors; these changes are due to changes in exchange rates and can even affect domestic firms with no international clients (Marston 2001; Dominguez & Tesar 2006; Lee & Jang 2010). Changes in price competitiveness that lead to changes in costs for the tourist are a key factor in touristic demand (Dwyer *et al.* 2000; Tsai *et al.* 2006; Masiero & Nicolau 2012). Recent studies even indicate that the price sensitivity of guests has

[45] Nonetheless, it is important to note that solely the degree of uncertainty does not influence the exchange rate exposure of a hotel and thus the degree to which it will be affected by changes in exchange rates (Holton 2004). If an open exposure is not reduced or hedged through exchange rate risk management, the effect of a change in the exchange rate on the hotel will be the same, whether the hotel manager is confronted with known or unknown uncertainty.

increased due to the large number of available destinations (Peng *et al.* 2015). Depending on the exchange rate elasticity of a hotel's guests, movements in the exchange rate will have stronger or weaker effects on the hotel's price competitiveness and on guests' demand (Mangion *et al.* 2005; Zhang *et al.* 2009; Chi 2015). The relevant exchange rate elasticity for a hotel is thus determined by its guest structure, especially with respect to nationality and travel motive, e.g., business or leisure (Ferro Luzzi & Flückiger 2003; Cortés-Jiménez & Blake 2011; Cheng 2012; Falk 2015). Therefore, movements in the exchange rate will have different effects on the price competitiveness of every hotel and thus affect its economic exposure differently. The relevant exchange rate elasticity of a hotel will also be influenced by the seasonal behaviors of the hotel's guest structure. Typically, leisure guests will exhibit stronger seasonal patterns than business guests. Additionally, different nationalities tend to exhibit different seasonal behavior. The effect of exchange rate changes might thus be exacerbated when they coincide with seasonal peaks in the demand of a hotel, particularly with peaks from price-sensitive guests.

The second channel through which the guest structure affects the exchange rate exposure of a hotel is the mode of payment (relation C-b-D). This channel influences the transaction and translation exposure of a hotel, which describe its exposure due to open contracts in foreign currencies and to foreign currency holdings, respectively (Hagelin & Pramborg 2004). The mode of payment depends to a large extent on the hotel's guest structure, which in this case depends mostly on the nationalities of the guests. Relevant aspects of the mode of payment are the invoicing currency and the currency which the hotels ultimately receive. Apart from the currency, a further important aspect of the mode of payment is the temporality of the payments. Even if the invoicing currency is a foreign currency, depending on the timing of the payment, the hotel will have a transaction exposure or not. If the guests pay the booking immediately, the hotel can directly exchange the income in foreign currency to Swiss franc and will thus have neither transaction nor translation exposure.

Because the guest structure is predetermined by – at least in the short run – established factors such as destination and hotel attributes, the hotel's exchange rate exposure is also established. However, exchange rate exposure can be influenced by the use of exchange rate risk management.

Exchange rate exposure (D)

Exchange rate exposure describes the impact of exchange rate movements on firms (Bartram *et al.* 2005). Commonly, transaction exposure, translation exposure and economic exposure are distinguished (Marshall 2000; Martin & Mauer 2003). While transaction and translation exposure are easily measurable, it is harder to quantify economic exposure, since it describes changes in price competitiveness relative to competitors, that is a dynamic interrelationship. It might be argued that ceteris paribus, the fiercer the competition, the larger the economic exposure of an average hotel and thus the larger the pressure to reduce its exposure.

Depending on the type of exposure and the nature of exchange rate change, a hotel will be affected differently. Volatility, thus short-term changes in exchange rates, affects a hotel primarily through transaction and translation exposure. Longer-term changes in exchange rates, such as in the case of the Swiss franc appreciation, however, will affect a hotel mostly through its economic exposure, thus changes in its relative price competitiveness.

While the factors leading to exchange rate exposure are the main interests of the conceptual framework presented in this paper, exchange rate exposure also has an influence on exchange rate risk management. On average, the larger the exposure, the higher is the pressure to reduce it with the help of exchange rate risk management. Additionally, depending on the extent and type of exposure, different exchange rate risk management strategies are relevant and will be applied (relation DE).

Exchange rate risk management (E)

The use of exchange rate risk management can reduce the exchange rate exposure of a hotel. Exchange rate risk management can be pursued by diversifying the guest structure directly (relation EC), by influencing the mode of payment through payment practices such as e.g. choosing the local currency as the invoicing currency (relation Eb), or by hedging open risks (Bartram *et al.* 2010) and thereby directly reducing exchange rate exposure (relation ED). The instruments of exchange rate risk management are sorted into the following categories: price policy and payment practices, operational hedging and financial hedging (see Table 70).

Table 70: Exchange rate risk management instruments

Category	Instrument / Strategy	Relevant time horizon of exchange rate change	Implementation costs
1. Price policy and payment practices	1.a passing-through	short-term to medium-term	low
	1.b choice of invoice currency	short-term to medium-term	low
	1.c leading and lagging	short-term to medium-term	low
	1.d currency clause	short-term to medium-term	low
2. Operational hedging	2.a operational matching of revenue and expenditures in foreign currency	short-term to long-term	medium to high
	2.b imports	medium-term to long-term	medium to high
	2.c diversification across currency areas	medium-term to long-term	medium to high
3. Financial hedging	3.a foreign currency debt	medium-term	medium
	derivatives such as e.g. 3.b forwards 3.c options	short-term to medium-term	medium

Source: Own table based on Döhring (2008); Ito *et al.* (2016)

As part of the price policy and payment practices (1.), hotels can adjust prices as a reaction to exchange rate movements. Highly competitive hotels can keep their prices in Swiss francs fixed or raise their prices in foreign currencies to offset losses from appreciation while maintaining a constant profit, thus passing-through changes in exchange rates to the guests. In this case, exchange rate changes do not influence the revenue of the hotel (Döhring 2008; Bartram *et al.* 2010; Ito *et al.* 2016). Empirical studies are, however, inconclusive about the effect of passing-through on exposure. While Bartram *et al.* (2010), for example, find that passing-through can reduce exchange rate exposure significantly, Ito *et al.* (2016) do not find a significant reduction in exposure. These inconclusive results might be explained by differences in industries or firms' competitiveness and thus their ability to successfully implement this strategy. Further strategies that lead to risk transfers to the counterparty when making or receiving payments, are the choice of the invoicing currency, as well as the use of leading and lagging and currency clauses. Several studies find that domestic currency invoicing leads to a reduction in exchange rate exposure (Ito *et al.* 2016). Similarly to passing-through, this strategy can only be successfully implemented by highly competitive hotels. Furthermore, the strategy's successful implementation is likely to depend on the nature of the

exchange rate changes as well as on the booking behavior of the guests. While in case of a price increase due to short-term changes in exchange rates, i.e. volatility, guests might already be locked into their booking, a more persistent, long-term appreciation might lead to decreases in demand, particularly if guests book at short-notice. Leading and lagging (Marshall 2000) and currency clauses are, especially in countries with access to developed foreign exchange derivative markets, no longer used on a regular basis (Kim & Sung 2005). Price policy and payment practices usually have rather low implementation costs.

Operational hedging (2.) can be divided into three strategies. The first strategy describes the operational matching of revenue and expenditures in foreign currencies (Pantzalis *et al.* 2001; Döhring 2008; Ito *et al.* 2016). The advantage of operational matching is that no costs for currency exchange accrue and, at the same time, the exchange rate exposure is reduced (Pantzalis *et al.* 2001). Secondly, in the case of a more persistent local currency appreciation, increased imports can help the hotel to save costs and stay price competitive. The third strategy is based on the principle of diversification (Kim *et al.* 2006). Companies that diversify their activities across different currency areas are less dependent on the movements of single currencies. Empirical evidence indicates that operational hedging reduces firms' exposure (Bartram *et al.* 2010; Ito *et al.* 2016). However, operational hedging can be costly to implement (Pantzalis *et al.* 2001), since it involves operational changes.

Financial hedging (3.) encompasses foreign currency debt, which describes the use of credit for hedging purposes, as well as the use of derivatives such as forwards or options (Döhring 2008). Previous studies confirm that the use of financial hedging can reduce exchange rate exposure substantially (Bartram *et al.* 2010; Ito *et al.* 2016). Financial hedging usually targets risks due to short- to medium-term changes in exchange rates and typically involves medium implementation costs.

Generally, the literature indicates that several exchange rate risk management instruments can be important in mitigating exchange rate exposure and that they act as complements rather than as substitutes (Kim *et al.* 2006; Bartram *et al.* 2010).

4.3 Methodology

Because this is an exploratory study with the goal of obtaining empirical evidence about the exchange rate risk exposure and management of small- and medium-sized hotels, a qualitative case study approach was adopted (Yin 2014). Specifically, a multiple case-study design was chosen, which has the advantage of producing more convincing and robust evidence than a single-case design (Eisenhardt & Graebner 2007). Prior to the data collection, a case study protocol was developed, comprising an overview of the case studies, the data collection procedure and the interview guidelines in order to increase the reliability of the case studies (Yin 2014). Because case study analysis, by definition, only comprises a small number of cases, the choice of those cases is crucial and therefore selective (Yin 2014). In order to depict the varied characteristics of the Swiss hotel industry, six Swiss hotels or hotel chains that differed in attributes such as size, guest structure and location were chosen.[46] The hotel case studies were complemented by a travel agency case study and a destination case study to provide a better understanding of the business environment in which the hotels operate.

Triangulation was applied as a research strategy, meaning that different data sources and methods were used (Hays 2004). The case studies were based on semi-structured interviews with the hotel managers as well as confidential corporate data. For each case study, a personal on-site interview was conducted, lasting 1.5 to 2 hours. Furthermore, semi-structured interviews with banking experts, focusing on financial hedging, complemented the information derived from the case study interviews and the corporate data. The fully transcribed interviews were searched for patterns, findings and concepts. This was achieved by comparing the interview protocols (Yin 2014) as well as by categorizing the evidence analytically (Miles & Huberman 1994). Because the case study data were collected with the help of guided interviews, the categories for the analysis were already given. The information can be divided into the two broad areas of exposure and exchange rate risk management. For the analysis, a cross-case synthesis was used, which means that the findings from each case were first aggregated and categorized for each

[46] The chosen cases are all members of the Swiss hotel association hotelleriesuisse. Members of hotelleriesuisse generate around 80% of all overnight stays in Switzerland and thus represent the Swiss hotel industry well. The research project was first presented to members of the directorate of hotelleriesuisse. Upon their approval and suggestion, the research project was thereafter presented to different discussion groups consisting each of 10-15 members of hotelleriesuisse. These discussion groups meet several times per year to discuss current issues in the hotel industry and to exchange experiences. Hotels with similar characteristics (e.g. hotels with strong seasonal demand) build a group. In order to consider the heterogeneity of the Swiss hotel industry, different groups (seasonal, leisure, city hotels) were met. The analyzed case studies were chosen from these groups.

case and then considered across all cases. The goal is to consolidate the system of categories and further develop it so that all cases are represented and the display of differences is possible. Three meetings with the discussion groups from which the case studies were chosen were held to discuss and validate the findings.

4.4 Results

4.4.1 Case studies

This chapter describes and analyzes the six hotel case studies. For each case study, the case and its framework conditions (most important destination attributes, hotel attributes and guest structure) are shortly introduced. Then, the case's exchange rate exposure is analyzed. In a next step, the case's current exchange rate risk management practices are presented. Finally, case-specific exchange rate risk management strategies are derived.

4.4.1.1 Case study I

Introduction

The analyzed hotel is a 4-star hotel with 45 rooms, located in a small destination in the Swiss countryside, which depends heavily on tourism. The destination is not well-known, particularly not outside of Switzerland. The hotel's guest structure is characterized by a high share of Swiss guests, with only 8% of the total overnight stays generated by foreign guests. Of the foreign guests, German guests form the largest group, followed by other European guests. Swiss and German guests account together for 96% of all overnight stays. The hotel focuses on families, thus on leisure tourism. The hotel manager claims to have a strong personal interest in exchange rate risk management.

Exchange rate exposure

The hotel seems to exhibit a substantial economic exposure. The hotel manager evaluates that the hotel is negatively affected by the Swiss franc appreciation. The hotel experienced a strong decline in demand from European, and particularly from German guests. In fact, over the course of five years, the overnight stays by German guests declined by more than 80%. The hotel manager argues that being positioned in the high-

price segment, the Swiss franc appreciation rendered the for German guests already relatively high prices even higher. However, the hotel was able to compensate the decline in guests from the euro zone with an increase in Swiss guests. Nonetheless, as Swiss guests increasingly ask for discounts, the hotel manager perceives them as more and more price sensitive.

The hotel has only very small transaction exposure, since it has only few contracts denominated in foreign currencies. The hotel has no transaction exposure from contracts with guests, because only Swiss franc is used as an invoicing currency. Transaction exposure accrues from imports only. The hotel imports per year products for around 10,000 euros from the euro area. Still, in comparison to the hotel's total expenses, this is a small amount. Exceptionally, in the case of major construction or renovation projects due in euro, this amount might be larger and increase up to 600,000 euros. In these cases, however, the amount will be hedged.

The hotel has a very small translation exposure from foreign currency holdings. The large majority of the guests, particularly the Swiss guests, pays directly at the hotel by credit card. When guests pay by credit card the amount is transferred to the hotel's bank account in Swiss francs independently of the currency chosen by the guest. Still, the hotel has some income in foreign currencies, since the guests are allowed to pay by cash in euro, USD or British pound. Around 50% of foreign guests make use of this possibility. By this, on average, the hotel receives around 100,000 euro per year. In contrast, cash income in USD and British is negligible. The income in euro is, if needed, spent on imports. If there is no immediate need for euros, the money will be exchanged to Swiss franc. Additionally, the hotel keeps around 50,000 euro partly in cash and partly on a euro bank account.

Exchange rate risk management

Price policy and payment practices

The hotel has not adjusted the prices and thus tries to pass-through the exchange rate to the guests. However, this practice led to declines in demand. Furthermore, the hotel uses Swiss franc as the only invoicing currency and thus transfers the transaction exposure to its guests. This practice is partly a conscious decision in order to actively avoid transaction exposure and partly implemented by default, because it has always been done this way.

Operational hedging

The hotel manager does not actively match revenues and expenditures regarding the currency structure. The hotel imports products from the euro area, in order to benefit from the strong Swiss franc. Since the administrative burden of importing individually is too high, the hotel joined a purchasing cooperative. Whenever the hotel plans major renovation or construction projects, the hotel manager will get a quote via the purchasing cooperative and often buy the product or service from abroad.
The hotel manager does not actively try to diversify the guest structure regarding the currency areas. In contrast, he intentionally focuses on Swiss guests. To explain this preference, the hotel manager refers to the hotel's small marketing budget.

Financial hedging

The hotel makes use of financial hedging in the case of larger contracts denominated in foreign currencies. As an example, the hotel hedged investment expenses for an indoor swimming pool denominated in euro with a forward contract.

Derived exchange rate risk management strategies

The hotel manager already implements several exchange rate risk strategies in order to reduce the hotel's exposure. However, the hotel's guest structure is very weakly diversified. This can largely be explained by the guest structure of the destination, which exhibits a comparable degree of diversification. Due to the lack of diversification, a change in demand from one of the key guest groups, has a disproportionately large effect on the hotel. The hotel manager claims not to have a large enough marketing budget to diversify the guest structure of the hotel. It is therefore suggested that the hotel cooperates in the area of marketing with the destination or with comparable firms in the region to pool resources.

Since changes in exchange rates will affect the price competitiveness of the hotel, apart from classical exchange rate risk management strategies, any other strategy, which helps the hotel to stay price competitive is recommended. On the one hand, unless already operating at the minimum cost-level for a given quality, the hotel could optimize its costs structure, e.g. by cutting input costs. Furthermore, the hotel might cooperate with other service providers within the destination and offer packages at an attractive price, e.g. several overnight stays combined with a ski pass. On the other hand, the

hotel might apply strategies which aim at reducing the guests' price-sensitivity and thus their sensitivity to changes in exchange rates. Thereby, a focus on the hotel's strengths such as its extraordinary family-friendly nature are recommended to help the hotel to differentiate itself from competitors.

4.4.1.2 Case study II

Introduction

The analyzed hotel has 77 rooms, is classified as a 4-star hotel and located in a city of medium to large size. The city is not a typical holiday destination, however, it is an important transport hub in the region. The hotel is located in close proximity to the local train station. The hotel's guest structure is well-diversified and characterized by the high internationality of its guest structure. 60% of the overnight stays are generated by foreign guests; 30% by guests from Europe and 30% by guests from outside of Europe. After Swiss guests (40% of the total overnight stays), German guests form the most important guest group (10% of the total overnight stays). The two largest guest group thus account for around 50% of all overnight stays. The hotel focuses on business tourists, but tries to attract leisure guests during the summer months in order to compensate the, due to seasonal factors, lower demand. Overall, the share of business guests amounts to almost 95%. The hotel manager claims to have no knowledge or prior experience regarding exchange rate risk management.

Exchange rate exposure

The hotel seems to exhibit only a small economic exposure. The hotel manager claims that the hotel is only slightly negatively affected by the Swiss franc appreciation. The hotel experienced some declines in demand from European guests. Thanks to its well-diversified guest structure and the relatively price-insensitive business guests, however, overall the hotel is not heavily affected and did not experience an overall decrease in guests.

The hotel has no significant transaction exposure, since it has almost no contracts in foreign currencies. The hotel uses Swiss franc as the only invoicing currency and thus has no transaction exposure from contracts with guests. The hotel has yearly expenses of around 5,000 euro, which are paid for commissions for a booking platform.

Moreover, the hotel has no noteworthy translation exposure. The large majority of guests pays directly at the hotel by credit card. When guests pay by credit card the amount is transferred in Swiss francs independently of the currency chosen by the guest. While regular guests from Switzerland additionally have the possibility to pay per bill, this is not possible for foreign guests. The number of foreign guests paying by cash is negligible. Thus, the hotel does not have any noteworthy income in foreign currencies. Accordingly, the hotel holds only around 2,500 euro, partly in cash and partly on a bank account.

Exchange rate risk management

Price policy and payment practices

The hotel has not directly adjusted the room prices and thus mostly passes the exchange rate through to the guests. However, in order to balance the seasonal demand, in the summer months, the hotel added complimentary breakfast to a package price in order to keep the demand of the more price-sensitive leisure guests stable. The hotel uses Swiss franc as the only invoicing currency. This is a conscious decision since the hotel evaluates the effort required to deal with foreign currencies as too high.

Operational hedging

Since the hotel has barely any income or expenses in foreign currency, the hotel manager does not try to match revenues and expenditures regarding the currency structure. Furthermore, the hotel manager prefers not to import products directly from abroad. Even though she agrees that products and services could be purchased at a lower cost from abroad, she prefers not to do so and to support, whenever possible, local businesses instead. The hotel manager does also not actively try to diversify the guest structure regarding the currency areas. However, due to the hotel's location, the guest structure is already relatively well-diversified.

Financial hedging

The hotel does not make use of financial hedging and has no intention to do so in the future.

Derived exchange rate risk management strategies

The hotel exhibits only relatively small exchange rate exposure. Thanks to its well-diversified guest structure and less price-sensitive business guests, the hotel is not strongly affected by the current exchange rate changes. However, it is nonetheless recommended that the hotel considers actively managing exchange rate risks in order to stay price competitive even in case of more extreme exchange rate changes. Even though the hotel manager prefers not to import, in case of an increase in competition, she might have to reconsider this strategy in order to safe costs. Since the hotel barely imports any expenses from abroad, already a small increase in imports might help considerably to safe costs. As the costs of direct importing are relatively high, particularly for smaller hotels, it is recommended that the hotel cooperates in the area of imports in order to benefit from economies of scale.

4.4.1.3 Case study III

Introduction

The analyzed hotel is a 4-star hotel with 89 rooms, located in a small city and holiday destination in the south of Switzerland, which is known for its mild climate. The hotel's largest guest group regarding the overnight stays are Swiss with a share of 63%, followed by Germans with a share of 15%. The two largest guest groups thus make up 78% of the hotel's overnight stays. The remaining 22% are generated mostly by other European guests. The hotel focuses primarily on leisure tourism, however, it increasingly tries to attract business guests as well. The hotel manager states that he has some limited knowledge about exchange rate risk management.

Exchange rate exposure

The hotel seems to exhibit an economic exposure. The hotel manager states that the hotel is quite negatively affected by the Swiss franc appreciation. The hotel experienced a strong decline in demand from European, and in particular from German guests. The hotel was able to compensate the decline in European guests only partly with an increase in Swiss guests.

The hotel further exhibits some transaction exposure. The hotel uses Swiss franc as the only invoicing currency, and thus has no transaction exposure from contracts with

guests. The hotel has some contracts with German and Italian travel agencies, however, the contract currency is Swiss franc as well, meaning that the travel agencies assume the exchange rate exposure. Transaction exposure accrues from expenses in euro. Typically, the hotel has yearly expenses of around 30,000 euro, mostly for software and marketing services. This equates to approximately 5% of the hotel's total expenses. However, in years in which renovation projects are conducted, this amount is higher and amounts to approximately 100,000 euro per year, which corresponds to around 10% of the hotel's yearly costs for renovation projects. In 2016, a major renovation project was implemented, which led to exceptional expenses of 250,000 euro, which corresponded to 25% of the total expenses in that year.

The hotel does not exhibit any noteworthy translation exposure. The large majority of guests pays directly at the hotel by credit card. When guests pay by credit card, the amount is transferred in Swiss francs independently of the currency chosen by the guest. The share of foreign guests that pays in a foreign currency in cash is relatively low and thus negligible. As a consequence, the hotel has no significant foreign currency holdings.

Exchange rate risk management

Price policy and payment practices

The hotel has not adjusted the room prices and thus tries to pass the exchange rate through to the guests. The hotel uses Swiss franc as the only invoicing currency. This is a conscious decision since the hotel wants to avoid transaction exposure.

Operational hedging

The hotel manager does not actively try to match income and expenses regarding the currency structure. In contrast, he tries to import products and services from abroad, mostly because of the lower prices and to benefit from the Swiss franc appreciation. However, he mentions that the most important cost factor is personnel. Therefore, he evaluates the potential to safe costs with the help of imports as limited. Furthermore, the administrative burden for imports is considered as relatively high. Thus, only larger imports are deemed worthwhile. Because of its small marketing budget and because of the opinion that the guest structure is largely predetermined by the destination, the hotel manager does not actively try to diversify the hotel's guest structure.

Financial hedging

The hotel does not make use of financial hedging.

Derived exchange rate risk management strategies

The hotel's guest structure is relatively undiversified. Therefore, it is recommended that the hotel implements strategies to diversify its guest structure and consequently diminishes its dependence from individual guest groups. Cooperation with other firms or the destination might be useful to pool limited resources. The hotel's expenses in euro exceed the hotel's income in euro considerably. Revenues and expenditures in euro could be matched in order to reduce exchange rate exposure and to avoid expensive currency change. The hotel has very little direct income in foreign currencies because almost all foreign guests pay by credit card and, in this case, the amount is transferred in Swiss francs independently of the currency chosen by the guest. The hotel manager could thus demand to receive the amount in euro if guests pay by credit card in euro. By doing so, he could receive sufficient funds to match any expenses for imports from the euro area. Additionally, while the hotel already imports some expenses, the amount is limited because of the relatively high costs to import individually. In order to benefit more from the strong Swiss franc, this amount might be further increased by cooperating with other hotels or firms in the area of imports.

The hotel has a certain transaction exposure in the area of investments. In the case of major investments with contracts concluded in euro, these expenses might be hedged with the help of financial derivatives such as forwards.

Finally, since the hotel's foreign guests are almost exclusively from Europe, the hotel manager could consider additionally offering prices in euro, thereby assuming some of the risks faced by guests, which might reduce some declines in demand. These risks could then be hedged with the help of financial derivatives such as forwards. However, this strategy is suitable mostly in the case of short- to medium-term exchange rate changes and helps less against persistent long-term exchange rate changes.

4.4.1.4 Case study IV

Introduction

The analyzed hotel is a 4-Star Superior hotel with 82 rooms and located in a famous high Alpine resort town. The hotel's guest structure is characterized by its high internationality. Regarding overnight stays, the largest groups are Swiss (33%), followed by German (20%), US-American (10%), British (7%) and Russian guests (7%). The two largest guest groups thus make up for around 50% of all overnight stays. The hotel primarily caters to leisure tourists. The hotel manager claims to have no knowledge about exchange rate risk management.

Exchange rate exposure

The hotel seems to exhibit an economic exposure. The hotel manager states that the hotel is negatively affected by the Swiss franc appreciation. The hotel experienced a decline in demand from European, particularly from German guests. Specifically, the hotel manager states to have lost around 40% of German guests. This decline in demand could not be compensated with increases in demand from other guest groups. In contrast, the hotel exhibits only a small transaction exposure. The hotel uses Swiss franc as the only invoicing currency, and has thus no transaction exposure from contracts with guests. The hotel has various contracts with travel agencies. However, the contract currency is Swiss francs and, consequently, the travel agencies assume the exchange rate exposure. The hotel has some expenses in euro, since it imports decorative articles and gifts for the guests. The costs for these purchases are between 30,000 and 50,000 euro per year. In comparison to the total expenses that the hotel faces, these costs are small.

The hotel has only a very small translation exposure. When guests pay by credit card the amount is transferred in Swiss francs independently of the currency chosen by the guest. While most guests pay by credit card, some guests pay in cash. It is estimated that around 20% of foreign guests pay in cash, which leads to income of around 100,000 euro in cash per year. The euros are normally immediately exchanged to Swiss franc. Income in other foreign currencies are negligible. The hotel holds only around 10,000 to 15,000 euro, partly on a euro bank account and partly in cash.

Exchange rate risk management

Price policy and payment practices

The hotel manager has not directly adjusted the room prices. However, the prices were indirectly adjusted by adding a complimentary ski ticket to a package price and by extending the entertainment offer. In the past, the hotel used to let its guests choose between Swiss franc and euro as an invoicing currency. However, currently, with the goal of avoiding transaction exposure, it uses Swiss franc as the only invoicing currency.

Operational hedging

The hotel manager does not actively try to match income and expenses regarding the currency structure. He tries to import products and services from abroad, mostly because of the lower prices and to benefit from the strong Swiss franc. However, in comparison to the total expenses, the imports are relatively small. The hotel manager mentions that the most important cost factor is personnel. The hotel employs several cross-border commuters, however, they are paid in Swiss franc.
The hotel does not individually try to diversify the guest structure, since its marketing budget is relatively small. However, the hotel cooperates with the destination and, additionally, it is a member of a hotel marketing organization. The hotel tries to reduce the dependence on German guests, which are seen as relatively price-sensitive and at the same time to focus more on price-insensitive markets.

Financial hedging

The hotel does not make use of financial hedging.

Derived exchange rate risk management strategies

Despite its relatively well-diversified guest structure the hotel is affected by declines in demand. This might be explained by the relatively price-sensitive leisure tourists. Lower revenues due to the appreciation of the Swiss franc could be off-set by lower costs, which are possible due to the appreciation of the Swiss franc when hotel managers choose foreign suppliers. It is thus recommended that the hotel increases its share of imports. As the costs of direct importing are relatively high, it is recommended that the hotel cooperates in the area of imports in order to benefit from economies of scale. At the moment, the hotel's income in euro exceeds its expenses in euro. Increasing imports

could also help to match revenues and expenditures in euro which would in turn avoid expensive currency exchange. Furthermore, the hotel employs several cross-border commuters and seasonal workers from the euro zone. It might be beneficial to consider paying these employees in euro.

Finally, since the leisure guests are relatively price-sensitive and thus react strongly to changes in exchange rates which influence the prices, strategies decreasing the price sensitivity of the guests might be beneficial. Since this is an upscale hotel, a pure price differentiation strategy might not be conducive. The hotel could thus focus on its strengths, e.g., the luxurious spa or achieve an outstanding quality of service, which helps the hotel to differentiate itself from competitors.

4.4.1.5 Case study V

Introduction

The analyzed hotel chain includes around 17, mostly 3-star hotels. The large majority of these hotels are located in cities. On average, 44% of the hotel chain's overnight stays are generated by Swiss guests. The largest group of foreign guests are Germans with a share of 19% of the hotel chain's overnight stays. Thus, these two guest groups account for 63% of the hotel chain's overnight stays. The hotel chain focuses mostly on business guests. The manager of the hotel chain claims to have only very limited knowledge about exchange rate risk management.

Exchange rate exposure

The hotel seems to exhibit an economic exposure. The hotel chain manager claims that the hotel chain is negatively affected by the Swiss franc appreciation. The hotel chain experiences declines in demand from European guests. In particular, the decline is pronounced for the German market. Overall, a shift towards a higher share of Swiss guests is noticeable.

The hotel chain has no significant transaction exposure, since it has almost no contracts in foreign currencies. The hotels of the chain use Swiss franc as the only invoicing currency and have thus no transaction exposure from contracts with guests. Several contracts with travel agencies exist, however, the contract currency is Swiss franc as well. The hotel chain spends only around 300,000 euros on imports per year. This amount

already includes renovation and construction projects. Apart from some minor renovation and construction projects, this amount is mostly spent on marketing and fees for booking platforms.
The hotel chain has only a minor translation exposure, since it has almost no foreign currency holdings. The large majority of guests pays directly at the hotel by credit card. Independently of the currency chosen by the guest, when they pay by credit card the amount is transferred into Swiss francs. Overall, the hotel chain has an income of around 250,000 euro due to cash payments, which is directly spent on imports. Income in other foreign currencies is negligible. The hotel chain holds only around 40,000 euro, mostly on a euro bank account.

Exchange rate risk management

Price policy and payment practices

The hotels of the hotel chain apply dynamic pricing. Overall, the prices had to be decreased to keep the demand stable. The hotel uses Swiss franc as the only invoicing currency, which is not a conscious decision, but part of a tradition.

Operational hedging

The hotel chain actively tries to match revenues and expenditure regarding the currency structure. Only a relatively small difference between revenues and expenditure remains. The hotel chain imports only small amounts. This is a conscious choice and part of the strategy, which encompasses sustainability and the support of local producers. It is argued that the guests expect local produce, particularly regarding food.
The hotel chain does not actively try to diversify the guest structure. Thanks to the different locations of the hotels, the guest structure is overall already relatively well-diversified.

Financial hedging

The hotel chain does not make use of financial hedging.

Derived exchange rate risk management strategies

Lower revenues due to the appreciation of the Swiss franc could be off-set by lower costs, which are possible due to the appreciation of the Swiss franc when the hotel chain chooses to import. It is thus recommended that the hotel chain increases its share of imports. Because of its sustainability strategy and the demand of the guests to receive local products, it is recommended that only standardized articles, such as e.g. certain beverages or furniture are imported. Further potential for importing might also lie in the area of construction works. When importing, because of its size, the hotel chain might benefit from considerable economies of scale.

The hotel already tries to match revenues and expenditures in euro in order to reduce exchange rate exposure and to avoid expensive currency exchange. Still, the expenses in euro already slightly exceed the income in euro. With increased imports this mismatch would grow even larger. Currently, when guests pay by credit card the amount is transferred in Swiss francs independently of the currency chosen by the guest. Therefore, it is recommended that the financial manager demands to be able to receive the amount in euro if guests pay by credit card in euro. By doing so, he could receive sufficient funds to match the expenses for imports from the euro area.

In case the hotel chain imports larger construction projects, which involve contracts concluded in euro, financial hedging with forwards could be considered in order to achieve certainty about the costs involved.

Furthermore, the hotel chain might consider offering additionally to Swiss franc also euro as an invoice currency. By this, the hotel chain would assume some of the risk faced by guests, which might reduce some declines in demand. Due to its size, the hotel chain might have the capacity to hedge these risks with financial hedging instruments. However, this strategy is suitable mostly in the case of short- to medium-term exchange rate changes and helps less against persistent long-term exchange rate changes.

4.4.1.6 Case study VI

Introduction

The analyzed hotel chain includes around 11, mostly 4-star hotels. The hotels are located in rural or alpine areas. One hotel is located abroad, however, it is a micro enterprise and thus not of relevance for the results of the hotel chain. Regarding the guest structure, on average, 54% of the overnight stays are generated by Swiss guests. The

second largest guest group are Germans with around 10% of the overnight stays. These two groups account thus for around 64% of the hotel chain's overnight stays. The hotel chain almost exclusively focuses on leisure guests. The manager of the hotel chain states that he has only very limited knowledge about exchange rate risk management.

Exchange rate exposure

The hotel chain seems to exhibit a relatively large economic exposure. The hotel chain manager claims that the hotel chain is strongly negatively affected by the Swiss franc appreciation, since it is confronted with strong declines from the European and British markets. Overall, the hotel chain counts fewer overnight stays, particularly during the winter months. During the summer months, the decline is less pronounced, since the hotel chain could benefit from an increase in demand from Asian guests. The demand from Swiss guests remained relatively stable.

The hotel chain displays some transaction exposure, mostly from imports. It does not exhibit any significant transaction exposure from regular income or expenses, since it has almost no contracts in foreign currencies. The hotels of the hotel chain use Swiss franc as the only invoicing currency and thus have no transaction exposure from contracts with guests. Contracts with tour operators exist, but the contract currency is Swiss franc as well. Regular expenses are only rarely imported. Examples are hotel-specific software and some non-food articles such as cosmetics. However, these imports are minor and negligible. In contrast, in years in which renovation and construction projects are implemented, expenses of around 2,500,000 euro per year might accrue. This corresponds to around 30% of the hotel chain's total expenses for renovation and construction projects.

The hotel chain has a negligible translation exposure. When guests pay by credit card the amount is transferred in Swiss francs independently of the currency chosen by the guest. While the large majority of guests pays directly at the hotels by credit card, the hotel chain has some income from cash payments in euro, yet these are negligible. These payments are paid into a euro account.

Exchange rate risk management

Price policy and payment practices

The hotel chain applies dynamic pricing. Due to decreases in demand, the prices had to be reduced. The exchange rate is thus not fully passed-through to the guests. The hotel uses Swiss franc as the only invoicing currency, transferring the transaction exposure to the guests.

Operational hedging

The hotel chain does not actively try to match revenues and expenditure regarding the currency structure. However, since the revenues and expenditures are rather small, the difference between them is mostly small as well. An exception are the years in which major construction and renovation works are implemented.
The hotel chain imports only very little. It is argued that the main regular cost factor is personnel and that in comparison, the costs that could be saved with imports are small. Furthermore, the hotel chain pursues a sustainability strategy which foresees that food and beverages are purchased locally. In contrast, in the area of renovation and construction works, around 30% are imported from the euro zone.
The hotel chain does currently not actively diversify its guest structure. It is argued that the guest structure is mostly given by the destination and cannot be influenced much. However, the hotel chain plans to expand to cities and potentially to the euro zone, in order to diversify. It is argued that the city hotels are less affected by the Swiss franc appreciation, since their guests are less price-sensitive.

Financial hedging

The hotel chain does not make use of financial hedging.

Derived exchange rate risk management strategies

The hotel exhibits a rather large economic exposure. The lower revenues due to the appreciation of the Swiss franc could be offset by lower input costs, which are possible due to the strong Swiss franc when importing from the euro area. Even though the main regular cost of the hotel chain is personnel, it is recommended that costs are decreased by importing more. Thanks to its size, when importing, the hotel chain can benefit from economies of scales, which makes importing, despite rather high fixed costs, attractive.

The hotel employs a significant share of cross-border commuters and seasonal workers. Employers' labor costs make up the biggest share of regular expenditures. Thus, it could be beneficial to pay cross-border commuters and seasonal workers in euro. However, because there exists a collective employment agreement in the Swiss hotel industry, it is crucial that minimum wages are respected independently of the currency used. Thus, this strategy might only work when a hotel is not already operating at minimum costs regarding the personnel.

Increasing imports and paying salaries in euro would lead to expenses which cannot be covered by the currently low revenue in euro. Thus, revenues and expenditures could be matched better to reduce exchange rate exposure and to avoid expensive currency exchange. The direct income in euro is very low because a significant share of foreign guests pays by credit card and, in this case, the amount is transferred in Swiss francs independently of the currency chosen by the guest. The hotel chain manager could thus demand to receive the amount in euro if guests pay by credit card in euro. By doing so, he could better match expenses for imports from the euro area.

Furthermore, in order to further diversify the hotel's guest structure, the hotel chain could acquire hotels with a different guest structure or even expand abroad.

Since the hotel chain exhibits transaction exposure in the area of renovation and construction projects, it is additionally recommended that the hotel hedges this exposure with the help of financial hedging instruments such as forwards, in order to achieve certainty about costs, particularly because of the hotel chain's strained financial situation.

Furthermore, the hotel chain might consider offering additionally to Swiss franc also euro as an invoice currency. By this, the hotel chain would assume some of the risk faced by guests, which might reduce some declines in demand. Due to its size, the hotel chain might have the capacity to hedge these risks with financial hedging instruments.

Apart from these classical exchange rate risk management strategies, other strategies which help the hotel to stay price competitive are recommended. On the one hand, unless already operating at the minimum cost-level for a given quality, the hotel could optimize its costs structure, e.g. by cutting input prices. Furthermore, the hotels of the hotel chain might cooperate with other service providers within the destination and offer packages at an attractive price, e.g. several overnight stays combined with a ski pass. On the other hand, the hotel might apply strategies which aim at reducing the guests' relatively high price-sensitivity and thus their sensitivity to changes in exchange rates.

Examples might be a unique offer or an outstanding quality of service which help the hotel to differentiate itself from competitors.

4.4.2 Overall results

This chapter presents the synthesized results of the multiple-case study analysis. The first part focuses on the factors and relationships that lead to exchange rate exposure in the Swiss hotel industry. The second part focuses on the current exchange rate risk management practices used in the Swiss hotel industry.

Exchange rate exposure

The analysis reveals that most hotels seem to have a significant economic exposure. For this reason, hotels are primarily affected by the persistent, long-term Swiss franc appreciation which takes effect through the economic exposure and manifests itself in declines in demand.

The analysis confirms that a hotel's guest structure is a key element in explaining its exposure, particularly its economic exposure. While all interviewed hotel managers report negative effects of the persistent Swiss franc appreciation, namely declines in demand from international guests, the analysis reveals that the extent of the decline mostly depends on the guest structure of the hotel. The hotels primarily face declines in guests from the euro area. These declines are especially striking for German guests, which, in all cases, are the most important guest group after the Swiss guests. Surprisingly, hotel stays from Swiss guests have remained relatively stable. However, there is a prevailing view that Swiss guests have become more price-sensitive. Overall, in line with lower guest numbers or lower prices, most hotels are experiencing lower revenues. Consequently, the analysis shows that, on average, hotels with a large share of European guests are more strongly influenced by the appreciation of the Swiss franc than hotels with a more diversified guest structure. Furthermore, the analysis reveals that rural hotels catering mostly to the needs of leisure tourists are more strongly affected than urban hotels with a large share of business guests.

The hotel managers further conclude that the guest structure is largely determined by the destinations' attributes and to a lesser extent by the hotels' attributes. A destination's attractions, location and market strategy are considered especially important factors in influencing a hotel's guest structure.

Both the transaction and translation exposure of the analyzed hotels are surprisingly small, even though most hotels have a substantial share of international guests, i.e., between 8% and 67%. Consequently, short-term exchange rate volatility, which mostly takes effect through transaction and translation exposure, is of less relevance in the Swiss hotel industry. The low transaction and translation exposures can be explained by the exchange rate risk management practices of the hotels, specifically by the mode of payment. All hotels choose Swiss francs as their invoicing currency, thereby transferring the exchange rate risk to their guests. Therefore, the hotels have almost no contracts in foreign currencies and hardly any transaction exposure. While the invoicing currency is the Swiss franc, most hotels allow their guests to pay in other prevalent currencies such as the euro, US dollar or British pound. On the day of payment, the prices in Swiss francs are converted into the respective currency. Additionally, when paying by credit card, regardless of the currency in which the guests pay, the hoteliers receive the amount in Swiss francs. Receipts in foreign currencies accrue only if the guests pay in cash. The share of foreign guests paying in cash varies considerably between the hotels and can range from negligible to – in one exceptional case – 50%. Accordingly, most hotels only hold small amounts of foreign currencies, so that their translation exposure is minor as well.

Exchange rate risk management

Instruments of exchange rate risk management used in the cases studied are passing-through (1.a), the choice of the invoice currency (1.b), operational matching of revenues and expenditures in foreign currency (2.a), imports (2.b), diversification across currency areas (2.c) and forwards (3.b).

Price policy and payment practices

Hotels vary in their price policies as a reaction to the appreciation of the Swiss franc and the resulting declines in demand. While the chain hotels lowered their room prices in response to the appreciation, the majority of the individual hotels did not reduce their prices. In two cases, however, the prices were indirectly adjusted by adding complimentary benefits to a package price and extending the offer. While the managers of the hotel chains argue that it was necessary to lower their prices to stay price-competitive, the hoteliers of the individual hotels fear that it would be difficult to increase their prices later on. However, all hotel managers agree that “the industry is affected by dumping prices”.

While most managers of individual hotels can “still afford to have fewer guests but at good prices”, the hotel managers of the chain hotels agree that “in most cases, it is more attractive to have guests at a low rate than no guests at all”. Overall, no hotel could prevent declines in overnight stays without lowering its prices or extending its offers. Thus, no hotel was able to successfully pass-through changes in exchange rates fully to the guests.

Another strategy of price policy and payment practices used is the choice of the invoice currency. In fact, all hotels charge their prices in Swiss francs and hence transfer the exchange rate risk of open bookings to their guests. Most hoteliers agree that they “deliberately do not offer fixed euro prices” because they “do not want to bear the exchange rate risk”.

Operational hedging

The case study analysis reveals that operational matching of revenues and expenditures in foreign currencies is barely used. Only one manager actively makes use of this practice to avoid currency changes and therefore exchange rate risks.

Some of the hotel managers, however, try to import products from the euro area in order to benefit from the strong Swiss franc. The share of imports from the euro area and thus the share of expenses in euro is, however, small for most hotels. Regarding regular expenses, the most important cost factor is personnel. Although cross-border commuters and seasonal workers from the euro area make up for a substantial share of some hotels’ workforces, salaries are paid in Swiss francs in all cases. The hotel managers disagree regarding the payment of cross-border commuters and seasonal workers from the euro area. While some interviewees stated that “since the Swiss hotel industry recruits a high share of employees from the euro area, there would be a high potential for operational hedging”, others argued that paying salaries in euro would be contradictory to their corporate philosophy. Notwithstanding this discussion, due to a collective employment agreement in the Swiss hotel industry, the minimum wages that are fixed in Swiss francs must be respected in all cases. In the area of goods and services, which is the second highest periodic cost factor, a very small share is purchased abroad; examples are marketing services, hotel-specific software, cosmetics or gifts for the guests. Because of administrative burdens and protective duties, and partly because guests expect local products, food and beverages are not directly imported. While regular expenses are rarely directly imported, some hotels import parts of their investments and renovation projects, mostly due to price advantages and the desire to benefit from the

strong Swiss franc. Due to these imports, and because the hotels have very little income in foreign currencies, expenditures in euro sometimes exceed income in euro.
The practice of operational hedging by diversifying the guest structure according to currency areas is barely used. Only one hotel manager actively tries to diversify the guest structure by cooperating with the destination and a marketing organization. The large majority of hotel managers agree that small hotels' marketing budgets are too small to influence their guest structures substantially. Only one hotelier disagreed, saying that "with a creative marketing strategy it is even for a small hotel possible to diversify". Nonetheless, the guest structure of a hotel is generally determined by the destination itself. The hotel managers agree that guests often choose their destination first, not their hotel. They argue that "if your hotel is located in a top destination, the guest structure is automatically diversified since such a destination attracts guests from all over the world".

Financial hedging

The case studies show that most hotels do not use financial hedging. Only one of the interviewed hoteliers has experience with financial hedging; he hedged his investment expenses for an indoor swimming pool denominated in euro with a forward contract.
A reason for the lack of financial hedging is that the hotels have almost no transaction or translation exposures from day-to-day operations that they could hedge. The hotel managers and banking experts agree that very low volumes in foreign currencies are commonly not hedged. Noteworthy amounts only accrue in individual cases of investments from building new facilities or renovation projects with suppliers from the euro area. The interviewed hoteliers mostly support the view that theoretically it would make sense to hedge these investment expenses. As the banking experts commented, "suitable instruments for small and medium-sized firms would be forwards since options are rather expensive and require a minimum volume, and for small foreign currency debt, the interest will be very high". Still, they mostly do not hedge their investments because "financial hedging is time-consuming" and, especially, hoteliers of small hotels "do not have the capacity for exchange rate risk management". Nonetheless, one banking expert added that "with new financial and technological developments, clients increasingly have options to efficiently and independently hedge online". However, the analysis further revealed that the hoteliers have only very limited knowledge about financial hedging. The banking experts agree that "many hotel managers are still not aware of the risks they face and how these risks might be hedged". Only recently have some of the

hotel managers started addressing the subject of financial hedging, stating that so far, they have “neglected the topic”.

4.5 Discussion and policy implications

This study shows that the hotels exhibit exchange rate exposure, in particular, economic exposure. It supports the results of Lee and Jang (2010) and Lee and Jang (2011) that even domestic hotels without subsidiaries abroad, which describes the vast majority of the analyzed hotels, face economic exchange rate exposure. All analyzed hotels claim to be affected by the appreciation of the Swiss franc through a loss of price competitiveness and subsequent declines in demand. Furthermore, we argue that even if a hotel does not have any subsidiaries abroad, it could still face transaction and translation exposure because international guests might pay in their local currency. The guest structure has been identified as a key factor in explaining a hotel’s exposure. However, the use of exchange rate risk management practices can considerably influence and reduce that exposure.

Surprisingly, the transaction and translation exposures of the hotels are small. Although Switzerland is a small country surrounded by the euro area, all hotel managers choose the Swiss franc as their invoicing currency, thereby transferring the risks to guests. This choice of strategy might be explained by its low implementation costs. Aside from this strategy, our study shows that hotels use exchange rate risk management only in isolated cases. The strategy to choose Swiss franc as the invoicing currency is helpful in the short run to reduce transaction exposure in the case of exchange rate volatility because guests have already booked their stay. However, with a longer-term appreciation, as is the case for the Swiss franc, this strategy becomes obsolete. Because guests do not hedge their expected hotel expenditures against exchange rate risks, hotel prices become too high and guests start substituting towards more price-competitive alternatives. While choosing the local currency as the invoicing currency indeed leads to low transaction and translation exposures, it has the negative effect of causing the hotels to face substantial economic exposure. Economic exposure might thus be the most important type of exchange rate exposure when the industry is confronted with persistent currency appreciation. In fact, the problem of economic exposure might be aggravated the longer an appreciation persists. While a hotel with sound finances might absorb a season with lower demand due to a medium-term appreciation and its related decrease in relative price-competitiveness, a prolonged appreciation might weaken its finances

more permanently and lead to postponement of investments. This in turn might deteriorate the hotel's competitiveness even more, particularly because many hotels do not compete exclusively over the price, but rather over the price-to-quality relationship. Additionally, economic exposure might be magnified when changes in exchange rate coincide with seasonal peaks in the demand of a hotel. Seasonality in turn is connected to the guest structure and the location of a hotel. Typically, alpine and rural hotels which cater mostly to leisure guests will exhibit stronger seasonal patterns than urban hotels with a high share of business guests. Additionally, different nationalities tend to exhibit different seasonal behavior.

In the literature, it is often argued that domestic and small firms have very limited potential for exchange rate risk management (Döhring 2008; Lee & Jang 2010). While there are certain hindrances, such as the lack of economies of scale, the non-attainment of minimum volumes for some financial instruments, capacity constraints and the inability to relocate easily, this paper argues that exchange rate risk management is feasible and important for small and domestic firms. While certain strategies can be implemented individually, others might have potential for cooperation in the area of exchange rate risk management. Traditionally, inter-firm relationships have been seen as either competitive or cooperative in nature (Walley 2007). However, in practice, firms might both compete and cooperate with each other simultaneously, which is often referred to as coopetition.[47] Since these two interactions contradict each other and might lead to tensions, it is suggested that cooperation and competition should be divided and allocated to either different functional aspects or to different business units and product markets (Bengtsson & Kock 2000).[48] Thus, hotels might for example compete over guests regarding their quality of service while they cooperate in the area of exchange rate risk management.

Switzerland, as a small country surrounded by the euro area, has strong potential for operational hedging. Such hedging could help reduce the substantial economic exposure faced by the hotel industry and is thus especially suited in the case of medium- to long-term appreciations. However, operational hedging is also rather costly and time-consuming to implement.

[47] Chim-Miki and Batista-Canino (2017) give an overview over the subject of coopetition in the tourism industry.

[48] It is suggested that firms cooperate with activities far from the customer and compete in activities close to the costumer.

Table 71: Overview strategies

Exposure	Category	Strategy	Relevant time horizon of exchange rate change	Implementation costs
Transaction Exposure / Translation Exposure	Operational hedging: Matching of revenues and expenditure regarding currency structure	Strategy 1: Match revenues and expenditure in euro / avoid currency exchange	short-term to long-term	medium
Economic Exposure		Strategy 2a: Directly import more products, services and investment goods	medium-term to long-term	medium to high
		Strategy 2b: Cooperate in the area of imports	medium-term to long-term	medium to high
		Strategy 3: Pay cross-border commuters and seasonal workers in euro	medium-term to long-term	medium to high
Economic Exposure	Operational hedging: Diversification regarding currency areas	Strategy 4a: Cooperate in the area of market cultivation	medium-term to long-term	medium to high
		Strategy 4b: Acquire different hotels, expand abroad	medium-term to long-term	high
Transaction Exposure	Financial hedging	Strategy 5a: Hedge investments in foreign currencies	short-term to medium-term	medium
		Strategy 5b: Cooperate in the area of financial hedging	short-term to medium-term	medium
Economic Exposure / Transaction Exposure	Financial hedging / Payment practices	Strategy 6: Assume and hedge risks	short-term to medium-term	medium to high

Source: Own table

Revenues and expenditures in euro could be matched (Strategy 1) in order to reduce exchange rate exposure and to avoid expensive currency exchange. However, most hotels have very little direct income in foreign currencies because a significant share of foreign guests pay by credit card and, in this case, the amount is transferred in Swiss francs independently of the currency chosen by the guest. The hoteliers could thus demand to receive the amount in euro if guests pay by credit card in euro. By doing so, they could receive sufficient funds to match their expenses for imports from the euro area.

Economic exposure is related to input costs, which are incurred either domestically or internationally. Lower revenues due to the appreciation of the Swiss franc could be offset by lower costs, which is possible due to the strong Swiss franc when hoteliers choose foreign suppliers (Strategy 2a). Products, services and investment goods could more often be directly imported, e.g., from the adjacent euro area. In the present situation, the hotels can benefit from the strong Swiss franc because they can purchase products and services at a lower rate abroad. This helps to reduce the high costs of the location-bound Swiss hotel industry and preserve its price competitiveness despite the Swiss franc appreciation. Individual hotels already try to hedge operationally by hiring foreign firms for their investments and renovation projects. Still, the amounts spent internationally are much lower than the revenue generated by foreign guests, and the corresponding cost savings cannot offset the lower revenues caused by declines in demand. The expenditures are small because operational hedging is barely used in daily business, as the costs of direct importing are relatively high, especially for small hotels. Therefore, it is recommended that firms cooperate in the area of imports in order to benefit from economies of scale (Strategy 2b). Cooperation between two or more hotels could potentially lead to the direct import of products. Furthermore, the bargaining power of a group of hotels is higher than that of a single hotel.

Employers' labor costs make up the biggest share of regular expenditures. Thus, it could be beneficial to pay cross-border commuters and seasonal workers in euro (Strategy 3). However, because there exists a collective employment agreement in the Swiss hotel industry, it is crucial that minimum wages are respected independently of the currency used.

Cooperation is also useful in terms of market development, as it may enable hotels to achieve a more diversified guest structure (Strategy 4a). Because many individual hotels lack the financial means to cultivate markets independently, they could cooperate to pool resources. Moreover, because the guest structure is at least partly determined by the destination, it could be beneficial for hotels to cooperate with the destination's marketing organization. Diversification regarding currency areas can also be achieved by acquiring hotels with a different guest structure, perhaps by expanding abroad (Strategy 4b). This strategy is predominantly suitable for hotel chains.

The hotels have a certain transaction exposure only in the area of investments because some conclude their contracts in euro. These amounts could be hedged with the help of financial derivatives such as forwards (Strategy 5a), which leads to certainty about the

costs involved. For small hotels, the costs of obtaining information about financial hedging – and the costs of using that strategy – may be too high. For this reason, it is also suggested that firms cooperate in the area of financial hedging (Strategy 5b), for example, by sharing knowledge.

As mentioned above, all analyzed hotels use the Swiss franc as their invoice currency. However, there might be potential for the hotels to offer prices in foreign currencies, thereby assuming some of the risks faced by guests, which might reduce some declines in demand. Thus, instead of transferring the risks to the guests, hoteliers could bear some of the risks by offering fixed prices in euro (Strategy 6). These risks can be hedged with the help of financial derivatives such as forwards. In fact, Friberg (1998) argues that forwards might make invoicing in foreign currency more attractive, and that the two strategies might be seen as complements. Döhring (2008) notes - and the banking experts agree upon this - that while many financial hedging strategies are more difficult for smaller firms, recent development in financial markets and technological improvements might make the use of derivatives as hedging instruments more feasible for them.

Apart from these classical exchange rate risk management strategies, any other strategy that helps to increase a hotel's relative price competitiveness and thus help to reduce its economic exposure might be beneficial. A higher relative price competitiveness means that the effect of exchange rate changes becomes less important and guests are less likely to substitute towards alternatives in case of an appreciation. On the one hand, in order to increase the relative price competitiveness of a hotel, unless already operating at the minimum cost-level for a given quality, the hotel could optimize its costs structure, which in turn allows to compensate for lower revenues due to lower prices or lower demand. Cost optimizations might for example be implemented through cost cutting of input factors, cooperation with other hotels or firms (e.g. in the area of procurement, accounting or IT) or through streamlining and simplifying the offer. On the other hand, the hotel might apply strategies which aim at reducing the guests' price-sensitivity and thus their sensitivity to changes in exchange rates. This might for example be achieved through an increased service quality, the creation of memorable experiences or individual guest attendance, which help the hotel to differentiate itself from competitors.

Ultimately, the Swiss hotel industry is overall rather heterogeneous and the individual hotels have different prerequisites and needs regarding the exchange rate risk management. The suitability and effectiveness of a suggested strategy or a set of strategies will therefore depend on the hotel's specific attributes and its exposure. The exact choice of strategies should consequently be determined on an individual basis. Still, the analysis

showed that the hotels are mostly affected by the persistent Swiss franc appreciation through their economic exposure. Therefore, despite their rather large implementation costs, it is suggested that exchange rate risk management strategies targeting the economic exposure might have the largest potential.

Our results come with some caveats. Firstly, because they are based on a case study analysis, they do not allow for generalizability beyond their unique setting. With the use of multiple case studies, triangulation, and validation of the results through groups of hotel managers, we try to mitigate this drawback. Nonetheless, while the results offer important initial insights into exchange rate risk exposure and management of the hotel industry, due to the rather small sample size, further research with a bigger sample size is required to validate the results. Secondly, because this study focuses exclusively on the Swiss hotel industry, it would be interesting to see if the results hold for other countries as well and if the strategies are applicable in different contexts or if they need adaptation.

4.6 Conclusions

The purpose of this study was to develop a conceptual framework explaining the factors leading to hotels' exchange rate exposure and how it can be reduced by exchange rate risk management. The study also investigated the case of the Swiss hotel industry to enrich this conceptual framework and illustrate the relationships among the factors.

Most investigated hotels have very little transaction or translation exposure because they employ the strategy of choosing the Swiss franc as their invoicing currency and therefore translate the exchange rate risk to their guests. The case study analysis indicates, however, that Swiss hotels exhibit substantial economic exchange rate exposure, which is evident in the form of a loss of price competitiveness and consequently in declines in demand. The extent of the exposure was found to depend considerably on the guest structure of the hotel. Despite that exposure, most hotels do not make use of an appropriate exchange rate risk management. While, in isolated cases, they use individual exchange rate risk management instruments, generally they are not aware of the open risks they face or of the potential for exchange rate risk management. The key finding of this study is therefore that most open risks are not sufficiently hedged. The reason for this is that most hotels are rather small and lack professional financial management. The hotel managers seem to have neither the time nor the knowledge to address questions of exchange rate risk management.

The results documented have several implications for hotel managers. Firstly, it is important that they are aware of the type of exposure they face and understand the factors leading to this exposure. Secondly, they should implement an appropriate exchange rate risk strategy for the open exposures. This study makes an important contribution to the existing literature by analyzing the exchange rate risk exposure and management of small- and medium-sized firms and deriving exchange rate risk management strategies that might also be suitable for other small- and medium-sized service companies.

5 Exchange rate risk management in the Swiss hotel industry: An empirical investigation

5.1 Introduction

For many countries, the tourism industry is an important export sector. This is also the case for Switzerland, where international guests account for 55% of overnight stays. The tourism industry is even one of Switzerland's largest export sectors (Ferro Luzzi & Flückiger 2003) and, especially in rural areas, an important job provider. Due to the hotel industry's international character, it is influenced strongly by exchange rate fluctuations. In fact, several studies show that exports are a key element in determining an industry's or a firm's exchange rate exposure (Allayannis & Ofek 2001; Dominguez & Tesar 2006). During the last decade, the Swiss franc (CHF) has overall been appreciating against most major currencies, particularly against the euro. This led to a loss of price competitiveness in the Swiss tourism industry, since the exchange rate is a key determinant of price competitiveness, which in turn is of paramount importance to an industry's performance (Mangion *et al.* 2005). The appreciation of the Swiss franc presents a major challenge to the hotel industry, especially since euro area guests are particularly price sensitive and account for the majority of international tourists travelling to Switzerland. Furthermore, the industry is confronted with relatively high exchange rate volatility, which leads to uncertainty about cash flows.

Exchange rate risk management can reduce exchange rate risk exposure substantially (Bartram *et al.* 2010; Ito *et al.* 2016). Firms can pursue exchange rate risk management with the help of financial hedging, operational hedging, the choice of the invoicing currency and price policies. In the literature, the strategies that are cited most often are financial and operational hedging. Financial hedges can protect a firm by using financial markets instruments such as derivatives or foreign currency debt; operational hedging can protect a firm through the matching of revenues and costs in a foreign currency and through diversification across different currency areas. Additionally, firms might choose the domestic currency as the invoice currency and thereby transfer the exchange rate risks to the counterparty. Furthermore, firms can adjust their prices in response to the exchange rate movements, i.e. pass-through the changes in exchange rates to the prices. Highly competitive firms can keep their prices in the local currency fixed or raise their prices in foreign currencies to offset losses from an appreciation while maintaining a constant profit (Döhring 2008; Ito *et al.* 2016).

Due to the importance of exchange rate risks to the hotel industry and the potential of exchange rate risk management to increase the industry's price competitiveness, it is essential to understand if the industry manages its exchange rate risks and to identify factors favoring the management of these risks. Despite the apparent importance, so far, there is limited or no prior research examining how exchange rate risk management is currently practiced in the tourism industry and which factors encourage the management of these risks. Lee and Jang (2010) explore the role of internationalization on exchange rate risk exposure for hotels and gaming firms and find significant exchange rate exposures for both international and domestic firms. They find that the percentage of domestic firms that is exposed to exchange rate risks is even higher than that of international firms. The authors suggest that this might be because international firms make use of operational hedging through international diversification. In a later study, Lee and Jang (2011) find that the majority of a sample of 18 US tourism-related listed companies have significant exchange rate exposure. Therefore, they suspect that several of these companies do make use of exchange rate risk management, but again, they do not investigate the use of exchange rate risk management. Singh and Upneja (2007) investigate the use of financial risk management in the hospitality industry in general. They find that only a few of the examined listed firms from the US lodging industry use derivatives to reduce their exchange rate exposure. However, it remains unclear if the firms made use of other exchange rate risk management strategies such as e.g. operational hedging. In a later study, Singh and Upneja (2008) investigate the factors influencing the decision whether or not to use derivatives for listed lodging firms. However, they do not focus specifically on exchange rate risks; in fact, they find again that the firms predominantly do not hedge exchange rate risks.

However, in Switzerland, as well as in many other countries, the hotel industry is small-scaled (Buhalis & Peters 2006), consisting mostly of small, non-listed firms. Due to differences in firm structure, which might e.g. lead to economies of scales, it cannot be assumed that these firms follow the same exchange rate risk management practices as large, listed firms. Furthermore, the literature indicates that factors explaining the use of exchange rate risk management might be different for small- and medium-sized firms relative to larger firms (Pennings & Garcia 2004; Bartram *et al.* 2009).

This paper contributes to the literature by investigating the current exchange rate risk management practices of the Swiss hotel industry and by analyzing the factors that encourage the use of exchange rate risk management. This is done by using a broad def-

inition of exchange rate risk management, instead of only focusing on derivatives. Consequently, this study distinguishes itself from others in terms of the depth of information on firm's exchange rate risk management. Furthermore, because the paper focuses on the Swiss hotel industry, it automatically focuses on mostly small and unlisted firms. Consequently, it also analyzes factors that favor the use of exchange rate risk management which are relevant to such firms. Identifying factors that are associated with the use of exchange rate risk management might provide policy makers with relevant information that allows them to promote the use of exchange rate risk management.
The remainder of this chapter proceeds as follows. Section 2 shortly reviews the most important rationales for the use of exchange rate risk management. Section 3 reviews the data and methodology used to conduct the research. Section 4 presents the results, discusses them and puts them into context. Finally, section 5 concludes.

5.2 Related literature

For more than 30 years, a multitude of studies has been trying to explain the rationales behind the use of financial risk management theoretically as well as empirically. Many studies do thereby not explicitly differentiate among different types of risks (e.g. exchange rate risks, interest rate risks etc.) that firms hedge (Dionne & Garand 2003; Aretz & Bartram 2010; Dionne & Triki 2013). The most widely cited theories suggest that risk management increases firm value if costs due to financial distress, a convex tax function, underinvestment problems, management incentives or economies of scale are present. These theories do not only apply to financial risk management in general, but also to exchange rate risk management.

Costs of financial distress: Exchange rate volatility can lead to cash flow volatility, which can, in turn, lead to situations in which a firm's available liquidity is insufficient to meet its financial obligations. Exchange rate risk management can reduce the probability of facing such situations and thus lower the expected costs associated with financial distress (Smith & Stulz 1985).

Convex tax function: In the case that a firm faces a convex tax function, high volatility of the income leads to too low taxes in some periods and disproportionately high taxes in other periods, since with a convex tax function the tax rate increases disproportionately with the income (Glaum 2002). This leads to a tax burden that is on average higher

than in the case of a more stable income. Assuming that exchange rate risk management reduces the volatility of taxable income, it will consequently reduce the expected value of tax liabilities (Smith & Stulz 1985; Glaum 2002).

Underinvestment: When raising external capital is costly, e.g. due to transaction costs and cash flows are unexpectedly low, it might not be possible for a firm to execute profitable projects, since external financing might be too expensive (Froot *et al.* 1993). Thus, the firm underinvests. The use of exchange rate risk management can reduce cash flow volatility and consequently avoid that a firm has to finance its projects externally (Glaum 2002) or needs to cut investments due to temporarily low cash flows (Arnold *et al.* 2014).

Management incentives: Many managers have a non-diversifiable risk position in the firm, since they derive a substantial part of their wealth from the firm. This risk can derive from financial interests such as future salaries or from non-financial interests such as reputation or career opportunities. Managers face the risk that the firm might not be able to meet their financial or non-financial interests, e.g. due to financial difficulties of the firm. Thus, they face a firm-specific risk. Since the managers are assumed to be risk averse, they will demand an extra compensation for bearing that risk, which is costly for the firm (Smith & Stulz 1985; Arnold *et al.* 2014). With the help of exchange rate risk management, the firm can reduce this risk to which managers are exposed at least partially. This will reduce the extra compensation needed, and thus add value to the firm (Arnold *et al.* 2014). Therefore, firms and their shareholders have an interest in applying exchange rate risk management. Managers will primarily pursue their own interests, unless their compensation contracts give them incentives to act in the best interest of the firm and its shareholders. For this reason, managers' contracts will often contain elements that tie their compensation to the value of the firm such as e.g. share ownership (Glaum 2002). If managers hold shares, part of their income depends directly on the firm's result and therefore they may have a direct incentive to make use of exchange rate risk management, in order to reduce cash flow volatility (Stulz 1984; Smith & Stulz 1985; Glaum 2002).

Economies of scale: A substantial share of the costs for exchange rate risk management consists of fixed costs, which implies a positive relationship between firm size and exchange rate risk management due to economies of scale. However, sometimes it is argued that the expected costs of financial distress negatively correlate with firm size.

This, in contrast, would imply a negative relationship between firm size and hedging (Glaum 2002).

While these theoretical rationales apply to corporate risk management in general, but also to specific risk management such as exchange rate risk management, several empirical studies have focused on the management of different types of risk (e.g. exchange rate risks, interest rate risks etc.), recognizing that different factors might be important for each type of risk (Allayannis & Ofek 2001). Other studies focus exclusively on exchange rate risks (Géczy *et al.* 1997; Kim & Sung 2005; Pramborg 2005; Schiozer & Saito 2009; Aabo *et al.* 2010).

Schiozer and Saito (2009) find evidence for financial distress as a rationale for the use of exchange rate risk management. Aabo *et al.* (2010), however, find only ambiguous evidence for this explanation while Pramborg (2005) finds no evidence at all. Schiozer and Saito (2009) investigate the convex tax function rationale in their study, but find no evidence to support it. The results of both Géczy *et al.* (1997) and Schiozer and Saito (2009) support the underinvestment rationale while Kim and Sung (2005) as well as Pramborg (2005) do not find any evidence for this theory. Regarding the management incentives, Schiozer and Saito (2009) find some evidence that informational asymmetry might increase the probability that a firm uses derivatives. The empirical evidence mostly supports a positive relationship between firm size and the use of hedging and thus supports the economies of scale rationale (Allayannis & Ofek 2001; Glaum 2002; Kim & Sung 2005; Singh & Upneja 2007; Yip & Nguyen 2012).

Overall, the evidence of the empirical studies for theoretical rationales remains controversial and ambiguous at best. The common theoretical rationales can explain the use of exchange rate risk management only to a very limited extent.

It is therefore likely that in addition to these commonly investigated rationales, there are further factors which may lead to exchange rate risk management, but which have not been theoretically motivated so far and therefore also have not been investigated empirically.

Bartram *et al.* (2009) suggest that research should focus on firm characteristics rather than on the classical theories. A few newer studies focus among others on firm characteristics such as e.g. the age of the firm (Aabo *et al.* 2010) or sector affiliation (Aabo *et al.* 2015), however, they find no significant results.

Several authors highlight the importance of managers' personality characteristics (Legohérel *et al.* 2004; Pennings & Garcia 2004; Herrmann & Datta 2005). It is suggested that especially in the case of small- and medium-sized firms, where managers play both strategic and operational key roles and hold extensive power within the firm, that managers' personal values and objectives are likely to influence the firm's organizational and strategic behavior significantly. Managers' risk attitudes and risk perceptions are further important factors that influence the firm's risk taking behavior and risk management practices (Pennings & Smidts 2000). Additionally, the firm's behavior is likely to be influenced by the manager's experiences and skills, with the latter often being linked to high educational attainment (Herrmann & Datta 2005). In fact, several researchers suggest that a higher education is positively correlated with greater innovation, knowledge, openness to change as well as a greater tolerance for ambiguity (Pennings & Smidts 2000; Herrmann & Datta 2005). All of these are qualities which are expected to encourage the use of exchange rate risk management (Herrmann & Datta 2005).

Allayannis and Ofek (2001) highlight the importance of exchange rate exposure as a determinant of hedging, which is confirmed by Kim and Sung (2005) for exposure due to export revenues. However, the literature remains scant. Additionally, Kim *et al.* (2006) suggest that the choice of an exchange rate risk management instrument might also depend on the use of other exchange rate risk management instruments.

The large majority of empirical studies focuses exclusively on hedging with financial derivatives (Géczy *et al.* 1997; Hagelin 2003; Schiozer & Saito 2009; Aabo *et al.* 2010; Lel 2012; Yip & Nguyen 2012). This might be explained by the fact that several studies are entirely based on data from firms' annual reports (Allayannis & Ofek 2001; Lel 2012; Yip & Nguyen 2012), which are easy accessible, but do not contain detailed information about a firm's exchange rate risk management. Therefore, on the basis of annual reports it is often only possible to determine if a firm makes use of derivatives or not. However, exchange rate risk management includes much more than the use of derivatives and encompasses further strategies such operational hedging, the use of foreign currency debt as well as price policies and payment practices (Kedia & Mozumdar 2003; Judge 2007; Bartram *et al.* 2010). Aretz and Bartram (2010) argue that a firm's risk strategy also takes into account the type and the level of the financial risks, the availability of risk management instruments as well as the operational environment of the firm.

Additionally, it is possible that the decision to use a certain exchange rate risk management and the extent of the hedging do not depend on the same factors.

Moreover, there are only few studies focusing on non-listed and consequently often smaller firms. The literature highlights that the factors leading to exchange rate risk management might be different for small- and medium-sized firms relative to larger firms (Pennings & Garcia 2004; Bartram *et al.* 2009). Furthermore, it is suspected that there is a relatively large heterogeneity regarding the determinants of risk management among small- and medium-sized firms, since those firms are characterized by a relatively wide range of different firm and management structures (Legohérel *et al.* 2004; Pennings & Garcia 2004).

5.3 Data and methodology

5.3.1 Data collection and survey

Since no data about the exchange rate risk management practices of Swiss hotels exists, following comparable studies (Hagelin 2003; Kim & Sung 2005; Pramborg 2005), for this study a survey approach was used to gather the necessary data regarding exchange rate risk management and data regarding potential factors explaining the use of exchange rate risk management. The questionnaire included 12 closed questions regarding the hotels' exchange rate risk management practices, hotel characteristics, management characteristics and exchange rate exposure. Furthermore, the questionnaire ended with an open-ended question, which allowed the hotel managers to leave comments and remarks about the topic.[49]

The survey was sent to all managers of hotels registered as members of the Swiss hotel association. At the time of the survey, the member database of the Swiss hotel association included 1,966 hotels. Of these, 1,515 indicated German as their main language of communication and 451 French.[50]

A self-administered online questionnaire was used as a method of data collection. This approach allows for the collection of a relatively large sample size in a time efficient manner. However, since the survey is self-administered, potential misunderstandings cannot be clarified. Therefore, it is crucial that every question is clearly formulated and comprehensible. In order to test the clarity of the questionnaire as well as to estimate the time needed to complete the questionnaire, a trial version of the questionnaire was

[49] The original questionnaire can be found in Appendix I: Survey questionnaire.
[50] The member database does not allow Italian as the main language of communication, which is also an official language of Switzerland.

pre-tested by several academics, hotel managers as well as hospitality experts. The feedback was used to refine and adjust the questions. Considering the multilingualism in Switzerland, the questionnaire, which was originally in German, was translated by professional translators to French and Italian. Thus, the hotel managers had the possibility to answer in their preferred language of communication, which is likely to have reduced any potential misunderstandings.

Since I inquired amongst others financial information from small- and medium-sized firms, it was especially important that the target population was aware of the benefits of the survey. Furthermore, it was crucial that the survey was not too time-consuming and could be completed within a reasonable amount of time. Schnell (2012) indicates that a survey should last maximally 30 minutes. A longer duration might lead to signs of fatigue and consequently to unreliable answers. Therefore, I aimed for a survey duration of 5 to 10 minutes. On average, the hotel managers needed around 5-6 minutes to complete the survey.

In order to raise awareness among the hotel managers, on October 30, 2017, the survey was announced in the Swiss hotels association's monthly newsletter, which is sent to its members in either German or French. In order to encourage participation, all participants of the survey had the chance to participate in a draw for a free job advertisement and two tickets for the participation in a tourism forum.

The actual survey was conducted between November 2017 and February 2018. On November 9, 2017, e-mails with a short description of the content of and the motivation behind the survey, an estimate of the time it would take to answer the survey, the promise of strict confidentiality, the possibility to participate in the draw and finally the links to the online questionnaires in the different languages, were sent to the hotel managers. Thereafter, on November 20, 2017 a reminder e-mail was sent to all the hotel managers that had not yet answered the questionnaire. Between January 15, 2018 and January 26, 2018 161 hotel managers were tried to be contacted at random by phone and asked to directly answer the survey. Upon request, the link to the online questionnaire was resent to them. The survey was definitely closed on February 12, 2018.

The survey lead to a unique cross-sectional data set about the exchange rate risk management practices in the Swiss hotel industry. The procedures discussed resulted in a response rate of 12.51%, since 246 of 1,966 hotels chose to answer the questionnaire

at least partially.[51] Keeping in mind the challenging conditions of the survey such as inquiring financial information from small firms, the response rate seems satisfactory.
The response rates of firm surveys vary strongly. Generally, the response rate is lower, if a survey includes questions about financial information, since the willingness to answer such sensitive questions is rather low. Additionally, past surveys showed that larger firms participate more often in firm surveys than smaller firms (Schnell 2012). In their survey about financial risk management of Japanese firms, Ito *et al.* (2016) achieved a response rate of 25%. Loderer and Pichler (2000) even attained a response rate of 35% in their survey among Swiss industrial groups. Schmid (2003), however, realized in a survey among the Swiss hotel industry a value of only 8%. Tajeddini (2010), in contrast, achieved an outstanding response rate of 82.5% for the Swiss hotel industry, using different strategies to attain a high response rate such as making several contacts, altering the length and form of the survey, sending personalized cover letters as well as promising feedback and confidentiality. He collected the data through personal interviews, either face-to-face or through phone contact. However, his sample population of only 189 hotels is small.

5.3.2 Variables

The variables inquired in the survey questionnaire can be divided into the two main categories exchange rate risk management and potential factors explaining the use of exchange rate risk management, that is exchange rate risk management determinants.[52]

5.3.2.1 Exchange rate risk management variables

The inquired instruments of exchange risk management can broadly be divided into the categories price policy & payment practices, operational hedging and financial hedging (see Table 72).

[51] Hotels that did not answer questions regarding their use of exchange rate risk management are not included and treated as non-respondents.
[52] Theoretically, most exchange rate risk management instruments and exposures concern foreign currencies in general. However, since in reality most Swiss hotels' revenues and expenses in other foreign currencies than euro are negligibly small, I focus in this analysis only on the use of euro.

Table 72: Exchange rate risk management

Exchange rate risk management				
Price Policy & Payment Practices		**Operational Hedging**		**Financial Hedging**
• pass-through • choice of invoice currency • euro account	+	• operational matching of revenue and expenditures in foreign currency • diversification across currency areas • imports	+	• foreign currency debt • derivatives

Source: Own table with elements from (Döhring 2008); Ito *et al.* (2016)

Pass-through: Hotels can adjust their prices in response to exchange rate movements, i.e. pass-through the changes in exchange rates to the prices. Highly competitive hotels can keep the prices in Swiss francs fixed respectively raise prices in foreign currencies in order to offset losses from the Swiss franc appreciation while keeping a constant profit. In this case, exchange rate changes do not influence the revenue of the hotel (Bartram *et al.* 2010; Ito *et al.* 2016). This, however, implies that the guests are not price sensitive. Otherwise, this practice might lead to a decrease in demand or even cancellations. Pass-through is not directly inquired, but measured in the form of the two binary variables “decrease CHF prices” and “increase euro prices”. Hotels not choosing the instrument “decrease CHF prices” and/or choosing “increase euro prices” are defined as the ones using passing-through as an exchange rate risk management instrument.

Choice of invoicing currency: By choosing Swiss franc as the invoicing currency, the hotels transfer the exchange rate exposure to their guests. Several studies find that domestic currency invoicing leads to a reduction in exchange rate exposure (Ito *et al.* 2016). However, similarly to pass-through, especially in the case of a major Swiss franc appreciation, this practice might lead to decreases in demand. The variable is binary.

Euro account: Having a euro account is considered a minimum requirement for basic transactions in euro as well as for several exchange rate risk management strategies such as e.g. matching. The variable is binary.

Matching: Matching describes the operational matching of revenue and expenditures in foreign currencies (Pantzalis *et al.* 2001; Ito *et al.* 2016). The advantage of matching is that no costs for currency exchange accrue, and at the same time, the exchange rate exposure is reduced (Pantzalis *et al.* 2001). The variable is on the one hand inquired as

a binary variable and on the other hand as a continuous variable, based on revenues in euro divided by total turnover and expenses in euro divided by total turnover.

Guest diversification: Based on the principle of diversification (Kim *et al.* 2006), hotels can diversify their activities across different currency areas and thereby reduce their dependency on the movements of single currencies and consequently their exchange rate exposure. The variable is binary and inquired by asking the hotel managers if they actively try to diversify their guest structure regarding the currency area, e.g. through marketing activities.

Imports: In times of a persistent local currency appreciation, as is the case for the Swiss franc (CHF), increased imports can help the hotel to save costs and stay price competitive. The variable is on the one hand inquired as a binary variable and on the other hand as a continuous variable. In order to measure imports as a continuous variable, I use expenses in euro divided by total turnover.

Financial hedging: Financial hedging instruments such as foreign currency debt as well as derivatives such as forwards or options can reduce a firm's exchange rate exposure substantially (Bartram *et al.* 2010). The variable is binary.

Exchange rate risk management index: Additionally, based on several of the inquired binary exchange rate risk management variables, I construct an exchange rate risk management index in order to measure the extent of the exchange rate risk management of a hotel. The more exchange rate risk management instruments a hotel uses, the higher the index. The index is a continuous variable.

The in the regression analysis as dependent variables used exchange rate risk management variables are defined as in Table 73.

Table 73: Exchange rate risk management variables

Binary (yes/no)	
Price Policy & Payment Practices	
Pass-through	Binary variable coded as 1 if use of pass-through; 0 otherwise
CHF invoicing	Binary variable coded as 1 if use of CHF invoicing; 0 otherwise
Euro account	Binary variable coded as 1 if use of euro account; 0 otherwise
Operational hedging	
Matching	Binary variable coded as 1 if use of matching; 0 otherwise
Guest diversification	Binary variable coded as 1 if use of guest diversification; 0 otherwise
Imports	Binary variable coded as 1 if use of imports; 0 otherwise
Continuous (extent)	
Operational hedging	
Matching	- |(revenues in euro - expenses in euro) / total turnover)|
Imports	expenses in euro / total turnover
Index of different strategies	
FXRMI	(guest diversification + imports + CHF invoicing + euro account + financial hedging + other strategy) / 6

Source: Own table

5.3.2.2 Potential exchange rate risk management determinants

Several factors from the risk management literature have been identified as potential determinants of a hotel's exchange rate risk management practices. The factors can be classified into the categories hotel characteristics, management characteristics and exposure (see Table 74).

Table 74: Potential exchange rate risk management determinants

Potential exchange rate risk management determinants				
Hotel characteristics		**Management characteristics**		**Exposure**
• Size • Star classification (Swiss Lodge, 1- to 5-Star) • Location (city, mountain area, other area)		• Capacity: Resources for exchange rate risk management • Knowledge: Access to knowledge and information about financial hedging • Innovation: Innovativeness		• Economic Exposure: Exposure due to foreign guests • Transaction Exposure: Exposure due to revenue in euro / revenue due to fixed euro prices • Transaction Exposure: Exposure due to expenses in euro

Source: Own table

Hotel characteristics

Size: An important firm characteristic that influences the use of exchange rate risk management is firm size. Size is a proxy for the cost of hedging or economies of scales. Exchange rate risk management is costly, with a significant share of the costs being fixed. This implies a positive relationship between firm size and exchange rate risk management. Thus, larger firms are believed to use exchange rate risk management more often (Pennings & Garcia 2004). Larger firms are more likely to have the necessary resources, knowledge and – in the case of financial hedging – the necessary trading volumes. Furthermore, it is possible that larger firms are evaluated as more creditworthy and therefore have better access to certain financial instruments. The empirical evidence mostly supports a positive relationship between firm size and the use of hedging (Allayannis & Ofek 2001; Glaum 2002; Kim & Sung 2005; Singh & Upneja 2007; Yip & Nguyen 2012). Typically, the logarithm of the book value of assets is used as a proxy for firm size (Kim & Sung 2005; Judge 2006; Singh & Upneja 2007). An alternative measure is the logarithm of the firm's sale as a proxy (Schiozer & Saito 2009). However, because this is sensitive data, the number of hotel rooms is used as a proxy for size and its coefficient is expected to be positive.[53]

Star classification: It is suspected that hotels with a higher star classification might overall be organized more professionally and have better educated employees than hotels with a lower star classification. Hotels with a higher star classification might therefore use exchange rate risk management more often than hotels with a lower classification. Therefore, star classification is used as a proxy for professionalism and its coefficient is expected to be positive.

Location: The location of a hotel might have an influence on its exchange rate risk management behavior. It is differentiated between location in a city, a mountain area or in other areas. It is assumed that the location has a significant influence on a hotel's exposure. Hotels in cities tend to have more business guests, which are on average less

[53] Hotels being part of a hotel chain might benefit from additional economies of scales. However, Switzerland counted in the end of 2016 only 218 chain hotels which equals 4.9% of the total hotel stock and a chain penetration by rooms of 19.9% (Wehrle 2017). In contrast, if the hotel is part of a chain with subsidiaries abroad it might be less likely to hedge since it is already indirectly hedged through the subsidiary. However, only a very small number of hotels has subsidiaries. Due to these reasons, chain hotels are not considered separately.

price sensitive than leisure guests. Due to their guest structure, hotels located in cities are thus on average less affected by exchange rate risks and might therefore make less use of exchange rate risk management, whereas hotels in mountain areas are affected more strongly. Consequently, the coefficient of city is expected to be negative while the coefficient of the mountain area is expected to be positive.

Management characteristics

Capacity: The higher a hotel's resources for exchange rate risk management, such as time and personnel, the more likely it will make use of it. The hotel managers were asked to assess their capacity for exchange rate risk management on a scale of 0 to 100. This self-reported variable is used as a proxy for capacity for exchange rate risk management and its coefficient is expected to be positive.

Knowledge: In order to make use of exchange rate risk management and especially of financial hedging, at least a basic degree of knowledge of it is required. A self-reported variable measuring knowledge or access to information about financial hedging on a scale of 0 to 100 is used as a proxy and its coefficient is expected to be positive.

Innovation: Innovativeness indicates whether managers are open to new ideas or information and are willing to use these in their firm. Empirical research shows that innovativeness is closely and negatively related to risk aversion (Pennings & Smidts 2000). Managers who describe themselves as more risk averse also seem to be less innovative (Pennings & Smidts 2000). The empirical literature investigated risk aversion of the management often as a potential determinant of exchange rate risk management. If the income of a risk averse manager depends on the success of the hotel, the manager has an inventive to hedge and thereby reduce the volatility of the cash flows (Stulz 1984; Smith & Stulz 1985; Glaum 2002). Dionne and Garand (2003) confirm that risk aversion of the management leads to hedging. However, since the use of exchange rate risk management is sparse in the Swiss hotel industry, it is possible that only very innovative managers make use of it, even though they might be more risk prone. A self-reported variable measuring innovativeness on a scale of 0 to 100 is used as a proxy and its coefficient is expected to be positive.

Exposure

In the literature, mostly three types of exchange rate exposure are differentiated: translation exposure, transaction exposure and economic exposure (Marshall 2000; Martin & Mauer 2003). Translation exposure arises when foreign currency holdings are translated for accounting purposes to the local currency (Hagelin & Pramborg 2004). It is mostly recommended not to hedge this type of exposure, since potential translation gains or losses tend to be unrealized and have little or no direct impact on a firm's cash flow. Due to its negligible impact, I omit translation exposure and control only for transaction and economic exposure. Transaction exposure arises due to open contracts in foreign currencies and refers to potential changes in the value of future cash flows as a result of unexpected changes in exchange rates (Hagelin & Pramborg 2004). It can be caused either by revenues or by expenses in foreign currencies. Economic exposure describes changes in price competitiveness relative to competitors due to changes in exchange rates (Marston 2001; Dominguez & Tesar 2006).

Transaction exposure due to revenues in euro: Following the literature, revenues in euro divided by total turnover are used as a proxy for the transaction exposure caused by revenues. Typically, the exposure arises due to contracts with prices in a foreign currency and these contracts are also settled in the currency stated in the contract. In the Swiss hotel industry, however, cases occur in which guests pay in euro, yet the invoicing currency is Swiss franc. This means that the hotel does not have a transaction exposure, even though it has revenues in euro, particularly if the revenue in euro is immediately exchanged back to Swiss francs. Therefore, if the revenues in euro divided by total turnover is used as a proxy for transaction exposure, the actual exposure due to revenues might be overestimated (see Table 75). Furthermore, the possibility exists that the contract states fixed prices in euro, yet the hotel generates revenue in Swiss franc, e.g. because the guests pay by credit card and the amount in euro is directly converted to Swiss franc. In this case, if the revenues in euro divided by total turnover is used as a proxy, the actual transaction exposure due to revenues might be underestimated. On balance, the two effects might cancel each other out. Based on the argument that firms with a higher exposure make more use of exchange rate risk management, its coefficient is expected to be positive. Additionally, *revenues due to fixed euro prices* divided by total turnover is inquired as an alternative proxy for the transaction exposure caused by revenues.

Table 75: Transaction exposure

Price	Revenues	Risk
Fixed euro price	Payment in euro	Risk due to contract in euro, euros can be used for expenses
Fixed Swiss franc price	Payment in euro	No risk due to contract, euros can however be used for expenses in euro (no currency change necessary)
Fixed euro price	Payment in euro, but hotel receives amount in CHF on account	Risk due to contract in euro (transaction exposure), euro cannot be used for expenses

Source: Own table

Transaction exposure due to expenses in euro: Expenses in euro divided by total turnover is used as a proxy for transaction exposure caused by expenses. Its coefficient is expected to be positive due to the exposure argument.

Economic exposure: Economic exposure is difficult to measure (Booth & Rotenberg 1990). As a proxy, the share of foreign guests is used. It is expected that the higher the share of guests, the more a hotel is affected by changes in exchange rates. Thus, its coefficient is expected to be positive.

A detailed description and the definition of the potential determinants of a hotel's exchange rate risk management variables, used as independent variables in the regression analysis, can be found in Table 76.

Table 76: Potential exchange rate risk management determinants

Category	Determinants	Definition
Hotel characteristics	Size	Natural logarithm of number of hotel rooms
	Classification	Factor (categorical) variable for star classification (Swiss Lodge, 1-Star to 5-Star Superior)
	Location	Factor (categorical) variable for location: city, mountain area, other areas
Management characteristics	Capacity	Self-reported proxy for capacity for exchange rate risk management; ratio between 0 and 1
	Knowledge	Self-reported proxy for access to knowledge and information necessary to use financial hedging; ratio between 0 and 1
	Innovation	Self-reported proxy innovativeness; ratio between 0 and 1
Exposure	Foreign guests	Share of foreign guests; ratio between 0 and 1
	Revenue in euro	Revenue in euro divided by total turnover; ratio between 0 and 1
	Revenue due to fixed euro prices	Revenue due to contracts with fixed euro prices divided by total turnover; ratio between 0 and 1
	Expenses in euro	Expenses in euro divided by total turnover[54]; ratio between 0 and 1

Source: Own table

[54] Including typical investment expenses

5.3.3 Estimation strategy

The decision to use a certain exchange rate risk management or not to use it can best be modelled as a binary dependent variable. Therefore, the literature mostly uses logit (logistic) (Nance *et al.* 1993; Mian 1996; Pramborg 2005; Judge 2006; Schiozer & Saito 2009; Lel 2012; Yip & Nguyen 2012) or probit models (Singh & Upneja 2008; Bartram *et al.* 2009) in order to determine factors that lead to that decision. I follow the literature and apply logistic regression analysis when investigating the use/non-use of a certain exchange rate risk management instrument.

With a multiple logistic regression model, the chance of a specific event, in this case the use of a certain exchange rate risk management instrument, can be modelled based on different predictor variables.

The main advantage of the logistic regression model $\pi(\boldsymbol{x})$ is that unlike a linear probability model based on OLS its estimates are bounded between zero and one. In order to satisfy this boundedness, the logistic regression model draws on a variant of the cumulative logistic function as the underlying probability function. The conditional probability that the outcome is present, meaning that a certain exchange rate risk management instrument is used, can be denoted as $\Pr(Y = 1) = \pi(\boldsymbol{x})$. The specific form of the logistic regression model is given by

$$\pi(\boldsymbol{x}) = \frac{e^{\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_p x_p}}{1 + e^{\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_p x_p}}$$

Performing the logit transformation of the multiple logistic regression model $\pi(\boldsymbol{x})$ leads to the logits or log-odds of the multiple logistic regression model:

$$g(\boldsymbol{x}) = ln\left(\frac{\pi(\boldsymbol{x})}{1 - \pi(\boldsymbol{x})}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_p x_p$$

where, for the multiple logistic regression model, $\pi(\boldsymbol{x}) = \frac{e^{g(x)}}{1 + e^{g(x)}}$ (Hosmer Jr *et al.* 2013). These so-called odds express the likelihood of an event to occur relative to the likelihood of its non-occurrence (Pampel 2000). The transformation leads to many desirable properties of the linear regression model. The logits or log-odds $g(\boldsymbol{x})$ (natural logarithm of the odds), is now linear in its parameters, may be continuous and may now range from $-\infty$ to $+\infty$, depending on the range of $\boldsymbol{x}$. However, unlike in the linear regression model,

the error term does however not follow a normal, but a binominal distribution (Hosmer Jr *et al.* 2013).

To estimate the logits, maximum likelihood (ML) as an iterative estimation method has to be used. The method of maximum likelihood yields coefficient estimates that maximize the logarithmic likelihood that the particular sample values of the dependent variable are observed based on the predictor variables (Hosmer Jr *et al.* 2013). In other words, the probability of getting the observed outcome based on the estimation is maximized (Pampel 2000).

In this specific application, the following econometric model specification results, where the subscript i represents an individual hotel:

$$\ln\left(\frac{\Pr(y_i=1 \mid \boldsymbol{x}_i, \boldsymbol{v}_i, \boldsymbol{\omega}_i)}{1-\Pr(y_i=1 \mid \boldsymbol{x}_i, \boldsymbol{v}_i, \boldsymbol{\omega}_i)}\right) = \alpha + \boldsymbol{\beta}\boldsymbol{x}_i + \boldsymbol{\gamma}\boldsymbol{v}_i + \boldsymbol{\delta}\boldsymbol{\omega}_i + \varepsilon_i$$

Thus, the logarithmic probability that a hotel i is a user of a certain exchange rate risk management instrument (see Table 73) is estimated by taking into account a vector of hotel-specific hotel characteristics $\boldsymbol{x}_i$, a vector of hotel-specific management characteristics $\boldsymbol{v}_i$ and a vector of hotel-specific exposure $\boldsymbol{\omega}_i$ (see Table 74).

While the slope coefficients with respect to sign and statistical significance can be interpreted the same way as OLS estimators, an economic interpretation of their absolute magnitudes is more difficult. In a linear regression model, the coefficients measure the marginal effects and these effects are constant over the sample. In the logistic regression model, however, this is no longer the case and the marginal effects depend on the point at which they are evaluated. Therefore, logits (log-odds) are often converted back into odds (chances), as these are more intuitive to interpret or, alternatively, average marginal effects are computed.

Since the decision to make use of exchange rate risk management and the extent of the use of exchange rate risk management might depend on different determinants (Nguyen & Faff 2002; Kim & Sung 2005; Aabo *et al.* 2015), I additionally analyze the extent of exchange rate risk management. In order to identify the factors determining the extent of exchange rate risk management, I run standard OLS regressions for the variables matching, imports and the exchange rate risk management index FXRMI. The following standard econometric model results, where the subscript i again represents an individual hotel:

$$Extent_i = \alpha + \boldsymbol{\beta x}_i + \boldsymbol{\gamma v}_i + \boldsymbol{\delta \omega}_i + \varepsilon_i$$

The dependent variable $Extent_i$ measures the extent of hedging. I measure the extent of hedging using the variables matching, imports and FXMI (see Table 73) in separate regressions. As stated above, the explanatory variables describe a vector of hotel-specific hotel characteristics, $\boldsymbol{x}_i$, a vector of hotel-specific management characteristics $\boldsymbol{v}_i$ and a vector of hotel-specific exposure, $\boldsymbol{\omega}_i$.

5.3.4 Discussion of methodological issues

The continuous variable matching is constructed as the negative absolute value of the difference between revenue in euro and expenses in euro, divided by total turnover (see Table 73). For this reason, when regressing matching on the explanatory variables, it is not possible to control for the exposure due to actual revenues in euro nor for the exposure due to expenses in euro. Using these variables as controls could lead to a spurious correlation.

Furthermore, I might be confronted with an endogeneity problem, since it is unclear, if a hotel uses matching because it has an exposure, or if the use of matching causes an exposure. This problem cannot be completely solved, since it is extremely challenging to find a suitable instrumental variable, since the dependent variable is constructed on the basis of the independent variables.

An option would have been to use lags of revenues in euro and expenses in euro as independent variables. If these variables are, however, barely changing over the years, they are strongly correlated. Therefore, this approach is unlikely to solve the problem. Simply leaving out these exposure variables, however, might lead to an omitted variable bias. Thereby, the effect of other independent variables on the use of matching might be over- or underestimated. Overall, this is however evaluated as less problematic than endogeneity.

In turn, in order to avoid the problem of a potential omitted variable bias, theoretically, a first-difference estimator could be used. However, this would mean that all the variables that are constant over time were dropped, which would be detrimental to the analysis since many control variables (e.g. star classification) are expected not to change over time. Furthermore, it would have been necessary to inquire all the variables at two different time points (T=2), which would have significantly increased the time required

to answer the questionnaire. Additionally, if the independent variables vary only little over time, it is very likely that the estimators would not be significant.
In the case that the data were to fulfill the random effects assumptions, it would also be possible to use pooled data and run OLS regressions. These assumptions are, however, rarely fulfilled. In this case too, it would be necessary to inquire all the variables at two different time points (T=2). The time structure of the data is, however, ignored since the model is estimated using pooled data and OLS.
The reasoning above also applies to the dependent variable imports, which is defined as the expenses in euro divided by total turnover. Consequently, it cannot be controlled for the exposure due to expenses in euro which are measured as the expenses in euro divided by total turnover.
Since a collection of panel data was evaluated as not feasible within the framework of this project, when regressing matching and imports on the explanatory variables, I leave out the variables revenue in euro and expenses in euro. However, in the case of matching, I additionally use the revenue due to fixed euro prices as an alternative control variable for exposure.

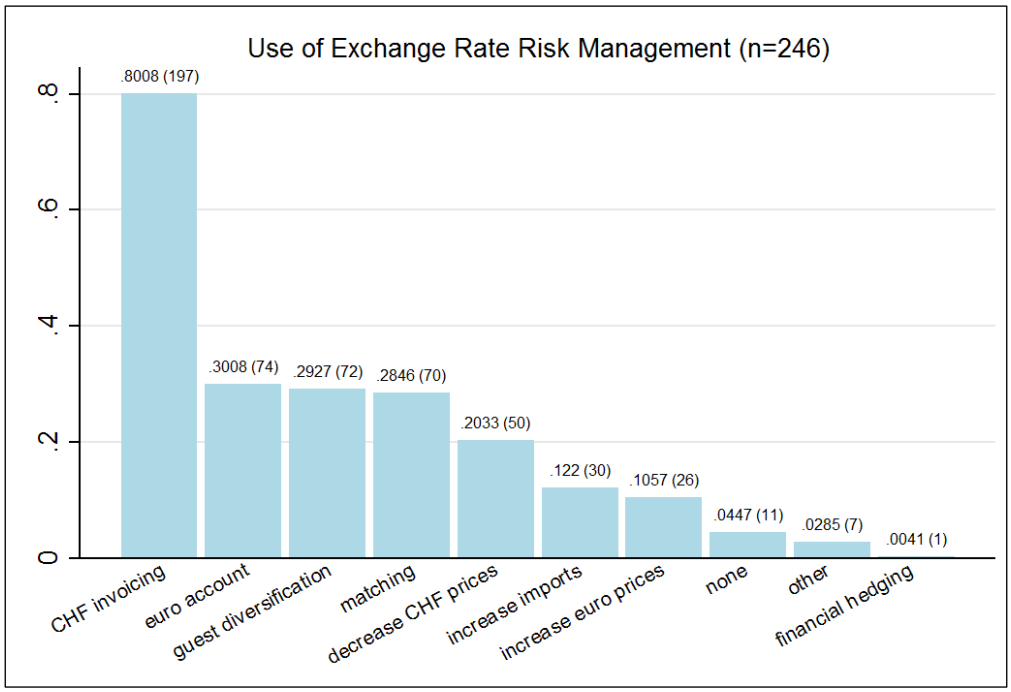
5.4 Results

5.4.1 Descriptive statistics

5.4.1.1 Exchange rate risk management instruments

Figure 4 gives an overview over the exchange rate risk management instruments used in the Swiss hotel industry.

Figure 4: The use of exchange rate risk management



Source: Own figure based on survey data

The analysis of the use of the exchange rate risk management in the hotel industry shows that the large majority of hotel managers resort to instruments in the category price policy and payment practices. Over 80% (197 out of 246 hotel managers) uses Swiss franc invoicing. Only around 20% claimed that they decreased their Swiss franc prices in reaction to the Swiss franc appreciation, meaning that around 80% passed-through the changes in the exchange rates to the prices. Merely around 11% passed-through the prices by increasing the euro prices, however; the large majority of the hotel managers do not offer euro prices in the first place. Approximately 30% of the hotel managers use a euro account in their hotel. Operational hedging such as guest diversification and matching is used by 29% and 28% of the hotel managers, while increased imports are only used by around 12%. This might be explained by the relatively high time requirement of importing. Financial hedging is barely used in the Swiss hotel industry, only one hotel manager claimed to make use of it.

5.4.1.2 Hotel characteristics

When comparing the sample hotel shares of the hotelleriesuisse star classification categories with the distribution of all members of hotelleriesuisse, only minor differences can be observed (see Table 77). This presents evidence for the fact that the sample dataset seems to reflect the characteristics of the hotelleriesuisse members regarding their classification very well.

Table 77: Comparison between population and sample regarding star classification

	Members hotelleriesuisse (population)		Members hotelleriesuisse (sample)	
Star classification	*Hotels*	*Share*	*Hotels*	*Share*
Swiss Lodge	275	14.67%	35	14.23%
1-Star, 1-Star Superior	12	0.64%	3	1.22%
2-Star, 2-Star Superior	142	7.58%	11	4.47%
3-Star, 3-Star Superior	877	46.80%	121	49.19%
4-Star, 4-Star Superior	471	25.13%	64	26.02%
5-Star, 5-Star Superior	97	5.18%	12	4.88%
Total	1,874[55]	100.00%	246	100.00%

Source: Own table based on hotelleriesuisse (2017) and survey data

A comparison of the sample with the population regarding the hotels' location reveals that overall the location is reflected adequately in the sample (see Table 78).

Table 78: Comparison between population and sample regarding location

	Members hotelleriesuisse (population)		Members hotelleriesuisse (sample)	
Location	*Hotels*	*Share*	*Hotels*	*Share*
City	631	33.67%	90	36.73%
Mountain area	1018	54.32%	118	48.16%
Other areas	225	12.01%	37	15.10%
Total	1,874[56]	100.00%	245	100.00%

Source: Own table based on hotelleriesuisse (2017) and survey data

[55] The difference to the total number of hotels contacted of 1,966 can be explained by the fact that some of the hotels are in the member database, however still under review and therefore not yet in one of the categories.
[56] See footnote 55

However, there is a slight underrepresentation of hotels located in the mountain area. This might be explained by the fact that the survey was executed between November and February, which coincides with the high season in many mountain areas. Therefore, hotel managers of hotels in this area might not have had the time to answer the survey.

There is no data about the average size of a hotel in the population available. The size of the hotels in the sample varies from only 4 rooms up to 330 rooms (see Table 79). On average, a hotel in the sample has 52.84 rooms.[57]

Table 79: Size of the hotels

	n	Mean	Median	SD	Min.	Max.
Number of rooms	246	52.8455	41.0000	45.4610	4.0000	330.0000
Number of rooms (log)	246	3.6513	3.7133	0.8084	1.3863	5.7991

Source: Own table based on survey data

5.4.1.3 Management characteristics

A comparison between the management characteristics variables capacity, knowledge and innovation shows that their mean values differ substantially depending on the method of data collection (see Table 80).

Table 80: Comparison between online survey and phone interviews

	Mean	n
online survey		
Capacity	0.3660	179
Knowledge	0.3572	179
Innovation	0.6667	179
phone		
Capacity	0.6786	35
Knowledge	0.6943	35
Innovation	0.8086	35
all		
Capacity	0.4171	214
Knowledge	0.4123	214
Innovation	0.6899	214

Source: Own table based on survey data

[57] In order to make sure that the sample is fully representative for the population, further characteristics would have to be compared. However, only data about the star classification and location is available for the population. The comparison of these variables shows that the sample is reasonably representative for the population.

While the mean values for the data collected by the online survey are 36.60% for capacity, 35.72% for knowledge and 66.67% for innovation, the mean data collected by the phone interviews for the same variables are 67.86%, 69.43% and 80.86% and therefore much higher. This might be explained by social desirability and by the fact that the hotel manager interviewed by phone were, in contrast to the hotel managers answering the online survey, not fully anonymous. Since the data from the phone interviews seems to have an upward bias, for the analysis I consequently only use the answers collected in the online survey for these variables.
Overall, the mean values for capacity and knowledge are very low, which indicates a general lack of resources and knowledge in the hotel industry. Most hotel managers lack the resources as well as the knowledge to address questions of exchange rate risk management. In contrast, the mean for innovation is relatively high, indicating that the hotel managers see themselves as rather innovative.

5.4.1.4 Exchange rate exposure

Most hotels have only small transaction exposures due to revenues or expenses in euro (see Table 81). On average, 9.32% of a hotel's revenue is in euro. The revenue that accrues due to fixed euro prices is even lower (3.50%), probably because many hotels do only offer fixed Swiss franc prices. On average, 5.44% of a hotel's expenses accrue in euro.

Table 81: Exchange rate exposure variables

	n	Mean	Median	SD	Min.	Max.
Revenue in euro	230	0.0932	0.0500	0.1062	0.0000	0.6500
Revenue due to fixed euro prices	227	0.0350	0.0000	0.1137	0.0000	1.0000
Expenses in euro	229	0.0544	0.0200	0.0929	0.0000	0.6500
Foreign guests	246	0.4333	0.4000	0.2261	0.0000	0.9800

Source: Own table based on survey data

On average, the hotels in the sample have 43.33% foreign guests. This is lower than expected, since in the Swiss hotel industry, 55% of overnight stays are generated by foreign guests. Consequently, hotels with a high share of Swiss guests are overrepresented in the sample.

5.4.2 Empirical results

In order to assess the power of firm characteristics, management characteristics and exposure in explaining the use of exchange rate risk management instruments, logistic regression analysis has been used.[58] In order to assess the power of these explanatory variables in explaining the extent of exchange rate risk management, OLS regression analysis has been applied. The explanatory variables have been tested for multicollinearity beforehand, which does not present an issue (see Appendix II: Model specification and fit).

For logistic regression models, the interpretation of the coefficients of the independent variables are not very intuitive and their absolute magnitude is difficult to grasp. For this reason, instead of coefficients, average marginal effects are presented for the regression analysis on the decision whether to use a certain instrument or not.[59] These average marginal effects are easier to interpret; as an example, on average the probability of a 3-Star Superior hotel to use passing-through is approximately 11 percentage points lower compared to a hotel in the base category, which is a Swiss Lodge hotel, describing a hotel without stars (see first column in Table 82). Similarly, given an approximately 10% increase in room size, on average the probability to use passing-through is increased by 10.9 percentage points. Average marginal effects are, however, only partially representative, because the true effects can vary a lot depending on the exact value of the specific variable. Robust standard errors are presented in parentheses.

Table 82 reports the results of the binary regression analysis on the use of price policy and payment practices. For each instrument the results are presented for the entire sample as well as only for the data from the online survey.

The results indicate that the likelihood of passing-through the exchange rate changes to the prices is lower for 3-Star (Superior) as well as 4-Star/5-Star (Superior) hotels relative to the base category Swiss Lodge hotels. An important factor explaining the decision of using pass-through is size; on average, larger hotels are more likely to pass-through exchange rate changes to prices. Regarding the management characteristics, innovation decreases on average the likelihood of using pass-through, whereas knowledge increases it. However, these effects are only significant at the 10% level.

[58] Classification tables for logistic regressions are presented in Appendix II: Model specification and fit, indicating a satisfactory model fit.
[59] Coefficients for all logistic regression results can be found in Appendix III: Logistic regression results with coefficients.

For Swiss franc (CHF) invoicing, the results do not display a clear pattern. Generally, the likelihood to use Swiss franc invoicing is lower for classified hotels in comparison to the base category Swiss Lodge.

Table 82: Results price policy & payment practices

	Pass-through	Pass-through	CHF invoicing	CHF invoicing	Euro account	Euro account
1-Star, 1-Star Superior,	0.0388	-0.102	**-0.262***	-0.221	0.135	0.0651
2-Star, 2-Star Superior	(0.622)	(0.402)	**(0.088)**	(0.101)	(0.343)	(0.628)
3-Star, 3-Star Superior	**-0.110***	**-0.217*****	**-0.107***	**-0.184*****	**0.167****	0.124
	(0.062)	**(0.000)**	**(0.096)**	**(0.002)**	**(0.019)**	(0.135)
4-Star, 4-Star Superior,	-0.0782	**-0.160****	-0.0915	**-0.181****	**0.262*****	**0.309*****
5-Star, 5-Star Superior	(0.314)	**(0.022)**	(0.254)	**(0.014)**	**(0.003)**	**(0.002)**
City	-0.0314	-0.124	-0.110	-0.117	**-0.157***	-0.107
	(0.681)	(0.122)	(0.127)	(0.134)	**(0.071)**	(0.253)
Mountain area	0.0366	-0.0219	-0.0856	-0.0974	0.113	**0.161***
	(0.610)	(0.776)	(0.182)	(0.165)	(0.213)	**(0.087)**
# of rooms (log)	**0.109*****	**0.0916****	-0.0211	0.0258	0.0508	0.0444
	(0.005)	**(0.025)**	(0.633)	(0.552)	(0.242)	(0.343)
Foreign guests	-0.156	-0.0676	0.142	0.185	0.00326	-0.0415
	(0.199)	(0.634)	(0.242)	(0.201)	(0.982)	(0.812)
Revenue in euro	-0.223	-0.231			-0.0574	0.116
	(0.309)	(0.425)			(0.854)	(0.741)
Expenses in euro	-0.135	-0.200	0.169	0.126	0.0797	0.0490
	(0.580)	(0.493)	(0.545)	(0.692)	(0.806)	(0.896)
Capacity		0.00604		-0.192		0.0877
		(0.960)		(0.109)		(0.467)
Innovation		**-0.163***		0.0930		-0.0210
		(0.078)		(0.395)		(0.854)
Knowledge		**0.228***		-0.00760		-0.0652
		(0.063)		(0.944)		(0.549)
Observations	227	175	228	176	227	175

*, **, and *** indicate significance at 10%, 5% and 1% levels, respectively

Source: Own table based on survey data

The results further indicate that 3-Star (Superior) as well as 4-Star/5-Star (Superior) hotels are more likely to have a euro account in comparison to the base category Swiss Lodge hotels. In the model without the management characteristics, city has a negative effect on the likelihood of using a euro account in comparison to the base category of

other areas. However, in the full model, this effect becomes insignificant, while the positive effect of mountain area becomes significant. However, these location effects are only significant at the 10% level.

Table 83 reports the results of the binary regression analysis on the use of operational hedging.

Table 83: Results operational hedging

	Matching	Matching	Increase imports	Increase imports	Guest diversification	Guest diversification
1-Star, 1-Star Superior,	0.0463	0.139	0.0559	0	0.00196	0.0549
2-Star, 2-Star Superior	(0.739)	(0.392)	(0.544)	(.)	(0.985)	(0.631)
3-Star, 3-Star Superior	0.0846	0.0986	**0.0920****	0	**0.219****	**0.288*****
	(0.353)	(0.347)	**(0.046)**	(.)	**(0.016)**	**(0.006)**
4-Star, 4-Star Superior,	-0.0440	0.0280	**0.110****	0	0.147	0.140
5-Star, 5-Star Superior	(0.666)	(0.807)	**(0.041)**	(.)	(0.125)	(0.222)
City	-0.0612	-0.0290	0.0158	0.0514	**-0.211****	**-0.244*****
	(0.537)	(0.794)	(0.818)	(0.618)	**(0.016)**	**(0.008)**
Mountain area	-0.100	-0.0740	0.0333	0.0950	0.00836	-0.00766
	(0.263)	(0.460)	(0.580)	(0.271)	(0.927)	(0.935)
# of rooms (log)	-0.0186	-0.0184	0.0330	**0.115****	**0.0754***	0.0741
	(0.681)	(0.710)	(0.385)	**(0.041)**	**(0.066)**	(0.105)
Foreign guests	-0.160	-0.0648	-0.0865	**-0.278***	**0.718*****	**0.876*****
	(0.285)	(0.718)	(0.415)	**(0.068)**	**(0.000)**	**(0.000)**
Revenue in euro	0.440	**0.611***	0.113	-0.0345	-0.138	**-0.501***
	(0.132)	**(0.055)**	(0.508)	(0.895)	(0.587)	**(0.078)**
Expenses in euro	0.334	0.0628			0.140	0.234
	(0.340)	(0.864)			(0.596)	(0.408)
Capacity		0.0878		**0.224***		0.0545
		(0.516)		**(0.074)**		(0.679)
Innovation		0.0198		0.139		**0.310*****
		(0.880)		(0.132)		**(0.009)**
Knowledge		0.0181		**-0.611*****		**-0.233***
		(0.892)		**(0.000)**		**(0.055)**
Observations	227	175	229	144	227	175

*, **, and *** indicate significance at 10%, 5% and 1% levels, respectively

Source: Own table based on survey data

The results show that the use of matching is not explained well by the model. Only revenues in euro are significant, however, only at the 10% level.

The results further indicate that the likelihood that a hotel chooses to increase its imports is higher for hotels with a higher star classification and larger hotels, whereas the likelihood is lower for hotels with more knowledge. Additionally, the likelihood of increasing imports is on average lower for hotels with a higher share of foreign guests and higher for hotels with a higher capacity; however, these effects are only significant at the 10% level.
Furthermore, the results show that the likelihood to use guest diversification is higher for 3-star (Superior) hotels, lower for hotels located in cities, higher for hotels with a higher share of foreign guests and higher for more innovative hotels. Additionally, at the 10% significance level, size increases the likelihood of using a euro account, while revenues in euro and knowledge reduce it.

Table 84 reports the results of the OLS regression analysis on the extent of the use of exchange rate risk management. Standard errors are presented in parentheses.
The results regarding the extent of exchange rate risk management show that the income due to fixed euro prices has a negative effect on the extent of matching. This might indicate that hotel managers find it challenging to match their revenue and expenditure in euro.
Imports increase with the size of a hotel, which is a proxy for economies of scale as well as with revenues in euro.
The exchange rate risk management index (FXRMI) increases for 3-Star (Superior) as well as for 4-Star/5-Star (Superior) hotels relative to the base category Swiss Lodge. Furthermore, it decreases for city hotels relative to hotels in other areas. Another variable that has a positive effect on the FXRMI is the share of foreign guests. Regarding the management characteristics, the FXRMI increases with innovation whereas it decreases with knowledge.

Table 84: Extent of hedging (continuous dependent variables)

	Matching	Matching	Imports	Imports	FXRMI	FXRMI
1-Star, 1-Star Superior,	0.0399	0.0135	0.00908	-0.0102	-0.0194	0.0174
2-Star, 2-Star Superior	(0.185)	(0.684)	(0.754)	(0.764)	(0.637)	(0.698)
3-Star, 3-Star Superior	0.0152	-0.00421	-0.0248	-0.0282	**0.0438***	**0.0596***
	(0.376)	(0.837)	(0.149)	(0.194)	**(0.100)**	**(0.053)**
4-Star, 4-Star Superior,	0.0103	-0.00902	-0.00947	-0.0117	**0.0583***	**0.0675****
5-Star, 5-Star Superior	(0.614)	(0.691)	(0.639)	(0.623)	**(0.068)**	**(0.048)**
City	-0.0182	-0.0164	0.0258	0.0271	**-0.0817*****	**-0.0655*****
	(0.317)	(0.431)	(0.147)	(0.217)	**(0.001)**	**(0.008)**
Mountain area	-0.0162	-0.0143	0.0197	0.0133	0.0136	0.0320
	(0.339)	(0.463)	(0.234)	(0.513)	(0.601)	(0.214)
# of rooms (log)	-0.00606	-0.00129	**0.0156***	**0.0227****	**0.0240***	**0.0371****
	(0.495)	(0.894)	**(0.077)**	**(0.028)**	**(0.100)**	**(0.028)**
Foreign guests	-0.0440	-0.0377	0.0233	0.0181	**0.139*****	**0.146*****
	(0.101)	(0.216)	(0.396)	(0.589)	**(0.000)**	**(0.002)**
Revenue in euro			**0.300*****	**0.318*****	-0.123	-0.216
			(0.000)	**(0.000)**	(0.284)	(0.116)
Revenue fixed euro prices	**-0.353***** **(0.000)**	**-0.369***** **(0.000)**				
Expenses in euro					0.144	0.169
					(0.192)	(0.130)
Capacity		0.0172		0.00419		0.0193
		(0.501)		(0.877)		(0.623)
Innovation		-0.0103		-0.0232		**0.103*****
		(0.657)		(0.346)		**(0.004)**
Knowledge		-0.0236		0.0255		**-0.134*****
		(0.333)		(0.320)		**(0.000)**
Constant	-0.0155	-0.0140	-0.0444	-0.0568	0.102*	0.00174
	(0.631)	(0.719)	(0.167)	(0.167)	(0.061)	(0.978)
Observations	223	172	227	175	227	175
R^2	0.218	0.271	0.199	0.219	0.154	0.258
Adjusted R^2	0.189	0.221	0.170	0.166	0.119	0.204

*, **, and *** indicate significance at 10%, 5% and 1% levels, respectively

Source: Own table based on survey data

5.4.3 Discussion of results

The large majority of hotel managers uses instruments in the category price policy and payment practices such as CHF invoicing and passing-through exchange rate changes to the prices. This might be explained by the relatively low implementation cost of these strategies. Furthermore, it is likely that the adoption of these strategies is only partly the outcome of a conscious decision making, but also partly by default, since it seems to be common practice to use Swiss francs as the invoicing currency and in the current case of a Swiss franc appreciation, keeping the Swiss franc prices fixed automatically translates to passing-through the exchange rate. By the use of these strategies, the exchange rate risk is shifted to the counterparty, which are in this case the guests. However, the hotels lose price competitiveness and since many guest groups are price sensitive, this might result in declines in demand. Since hotel room nights are by nature non-storable and perishable, and they exhibit high fixed and low variable costs, it might often be more beneficial for the hotel to sell the room at a lower rate instead of leaving it empty and having no revenue at all.

Because the hotel industry has been confronted with a persistent Swiss franc appreciation already for several years, operational adaptions in the form of operational hedging might consequently be more promising to stay price competitive and keep the guest demand stable. Operational strategies such as guest diversification and matching are both used by around 30% of the hotel managers. However, imports, which might compensate lower revenues due to the appreciation of the Swiss franc through lower costs, are only used by a relatively small fraction of hotel managers. This might be explained by the relatively high implementation cost of this strategy. Interestingly, 3-Star (Superior) as well as 4-Star/5-Star (Superior) hotels, which are more likely to use imports as a strategy, are also less likely to pass-through exchange rate changes to their prices and thus transfer the risks to their guests. It seems that these hotels are able to assume some of the exchange rate risks due to increased imports.

Despite recent developments in financial markets and technological improvements which e.g. led to the possibility of financial hedging through online platforms, and which might make the use of financial hedging more accessible to smaller firms, financial hedging is barely used in the Swiss hotel industry. The reasons for this include the very small transaction and translation exposures, which can be explained by the prevalent practice of Swiss franc invoicing. Furthermore, several studies emphasize the importance of financial skills for hotel managers (Kay & Moncarz 2004; Harper *et al.* 2005; Burgess 2007). However, the Swiss hotel managers assess their knowledge regarding the use

of financial hedging or their ability to access this knowledge on average as low, which might further impede the use of financial hedging.

I find that several factors favor the use of exchange rate risk management: exposure, firm characteristics such as star classification and size as well as management characteristics such as innovativeness and knowledge.

An important factor that leads to the use of exchange rate risk management is exchange rate risk exposure. Hotels that have a higher exposure, are also more likely to make use of exchange rate risk management. Hotels with a higher share of guests manage exchange rate risks more often, which is evidence that a higher exposure leads to more exchange rate risk management, since foreign guests are more price sensitive than Swiss guests. Additionally, the analysis shows that city hotels make less use of exchange rate risk management. However, it can be argued that this is the case, because they are less affected by exchange rate changes. City hotels usually have an above average share of business guests, which tend to be less price sensitive than holiday makers.

Regarding hotel characteristics, the results indicate that a higher classification is an important factor in explaining the use of exchange rate risk management. 3-Star (Superior) and 4-/5-Star (Superior) hotels are more likely to use instruments and also to make use of several instruments. This might be explained by the circumstance that these hotels might overall be managed more professionally. Another important factor in explaining the use of exchange rate risk management is hotel size. Larger hotels are more likely to manage exchange rate risks and to do so more extensively, which is an indication for economies of scale.

Finally, the results indicate that management characteristics play a role in explaining the use of exchange rate risk management. Hotel managers that see themselves as more innovative are more likely to manage exchange rate risks. Finally, the results indicate that knowledge about financial hedging seems to have a negative effect on exchange rate risk management in general. This result is rather counterintuitive. Therefore, it is worth considering that knowledge about financial hedging is not a good measure for knowledge about exchange rate risk management in general.

5.4.4 Robustness of results

The results showed that 3-Star (Superior) and 4-/5-Star (Superior) hotels are more likely to make use of exchange rate risk management and are also more likely to use it to a greater extent. At the same time, I find that these hotels are less likely to pass-through exchange rate changes to prices. I argue that due to their exchange rate risk management, these hotels can afford to assume some of the risks of their guests and do therefore not pass-through the exchange rate changes to the prices.

Alternatively, this behavior might also be interpreted as a sign of exposure. Hotels that are not price competitive enough, cannot pass-through the appreciation of the Swiss franc to the prices without facing substantial declines in demand. A competing explanation for the use of exchange rate risk management of 3-Star (Superior) and 4-/5-Star (Superior) hotels is therefore that they manage the risks more often not because they are more professional, but because they are more affected by exchange rate changes than lower classified hotels, e.g. because their prices were already rather high before the appreciation. In fact, I find that hotels with a higher exchange rate exposure are also more likely to manage exchange rate risks. Therefore, it is possible that I have not controlled fully for the exchange rate exposure hotels are exposed to. Especially economic exposure, which describes the change of competitiveness of a hotel or destination relative to its competitors, is difficult to measure.

In order to test the hypothesis that not passing-through exchange rates is a sign of exposure, and to support or reject the above reasoning, the regression analysis performed in chapter 5.4.2 Empirical results is repeated. This time, in all regression a dummy variable indicating that a hotel did not use passing-through is included as an additional control for economic exposure. The results of this robustness test show that the overall results are stable and do not change after including the additional dummy variable (see Appendix IV: Regression results for robustness considerations).

The dummy variable of not passing-through is only significant for the regression on the decision to increase imports (see Table 101). The effect is positive, which shows that hotels which do not pass-through exchange rate change to prices are more likely to increase imports. The hypothesis that not passing-through might be a sign of exposure is therefore not confirmed. On the contrary, it seems that higher classified hotels use increased imports as an alternative to passing-through. By this, they can afford to lower their prices and avoid a decrease in guest demand. They might have realized that passing-through can successfully be applied in the case of exchange rate volatility or a short-term appreciation, whereas in the longer run, it is often accompanied by a loss of price

competitiveness and consequently leads to declines in demand. In the case of a longer-term appreciation such as the Swiss franc appreciation, operational hedging might be the more adequate strategy to manage exchange rate risks. Overall, it can be concluded that the results of chapter 5.4.2 hold and that the variables used adequately control for exchange rate exposure.

5.5 Conclusions and implications

In this paper, I expand the knowledge about the exchange rate risk management in the Swiss hotel industry. This is the first quantitative study to investigate the use of exchange rate risk management and its determinants for the small-scaled hotel industry.
The most frequently used exchange rate risk management practice in the Swiss hotel industry is the use of Swiss franc (CHF) invoicing. Thereby, the hotel managers transfer the exchange rate risks to their guests. However, since most guests are price sensitive, this behavior might lead to declines in demand. Furthermore, an important share of hotel managers makes use of operational hedging by diversifying their guest structure or matching revenues and costs in euro. In contrast, financial hedging is barely used.
These findings highlight the importance of the diversity of instruments available to firms in managing exchange rate risks. For small- and medium-sized firms, restricting the analysis to financial hedging with derivatives only, as it is often practiced in the literature would have given only a partial and biased view of their real exchange rate risk management practices.
Regarding the factors that favor the exchange rate risk management, this study goes beyond the traditional rationales of exchange rate risk management and investigates factors that might be of more relevance to the small-scaled hotel industry. I find that exchange rate exposure is an important determinant of exchange rate risk management. Hotels with a higher exchange rate exposure, e.g. due to a higher share of international guests, are more likely to use exchange rate risk management. Furthermore, firm characteristics matter, since there is evidence that higher classified as well as larger hotels use exchange rate risk management more often; likely due to a higher level of professionalism and economies of scale. Finally, management characteristics also determine if a hotel manages its exchange rate risks. The more innovative hotel managers consider themselves, the more likely they are to make use of exchange rate risk management. Surprisingly, a higher knowledge about financial risk management is negatively related to the use of exchange rate risk management.

The main limitation of this study is the fact that it is based on cross-sectional data. Thus, it presents the current state of exchange rate risk management and its determinants and cannot take into account the time horizon. Additionally, due to the nature of the data there might be some potential endogeneity issues, which cannot be fully addressed.
Furthermore, my results are based on the Swiss hotel industry, which consists mostly of small- and medium-sized firms. Switzerland is a small and open economy. Thus, my results might not be readily transferable to the hotel industry in larger, more closed economies. However, it is likely that the results hold true for other small-scaled industries in comparable countries. Moreover, provided that the globalization is continuing, in the future, the present results might also be representative for small- and medium-sized firms in larger, more closed economies.
This study has several practical implications. It shows that many hotel managers lack the resources and knowledge necessary to address questions of exchange rate risk management professionally. Generally, the exchange rate risk management is still in an early stage of development in the hotel industry. Often, the hotel managers only react when they are already confronted with the risks, instead of managing them actively. Therefore, in order to promote the use of exchange rate risk management in the industry, it is important that policy makers raise awareness among the hotel managers regarding the issue, e.g. through specialized training. Furthermore, since mostly higher classified and larger hotels make use of exchange rate risk management, it might also be worthwhile to specifically target lower classified and smaller hotels. Additionally, smaller hotels might cooperate in the area of exchange rate risk management, in order to benefit from economies of scale.

5.A Appendices to chapter 5

5.A.1 Appendix I: Survey questionnaire

Original questionnaire (German version):

Herzlichen Dank für Ihre wertvolle Zeit! Die Umfrage wird rund 10 Minuten beanspruchen. Sie helfen uns mit Ihren Angaben wesentlich, neue Erkenntnisse bezüglich des Umgangs mit Währungsrisiken in der Schweizer Hotellerie zu gewinnen.

Sämtliche Angaben werden streng vertraulich behandelt und anonymisiert ausgewertet.

1. Zu welcher Sternekategorie gehört Ihr Hotel am ehesten?

Swiss Lodge
1-Stern, 1-Stern Superior
2-Sterne, 2-Sterne Superior
3-Sterne, 3-Sterne Superior
4-Sterne, 4-Sterne Superior
5-Sterne, 5-Sterne Superior

2. Wo befindet sich Ihr Hotel?

Stadt
Berggebiet
Übrige Gebiete

3. Über wie viele Zimmer verfügt Ihr Hotel?

_____ Zimmer

4. Wie sieht Ihre Gästezusammensetzung ungefähr aus?

Anteil Schweizer Gäste (%): ___
Anteil Gäste aus dem Euroraum (%): ___
Anteil Gäste aus Asien (%): ____
Anteil Gäste aus Nord- und Südamerika (%): ____
Anteil restliche ausländische Gäste (%): ___

5. Von welchen der folgenden Strategien zum Umgang mit Währungsrisiken machen Sie in Ihrem Hotel Gebrauch? *(Mehrfachnennungen möglich)*

- o Aktiver Versuch, Einnahmen und Ausgaben in den gleichen Fremdwährungen zu haben (daher weniger Währungswechsel notwendig)
- o Vermehrter Einkauf im Ausland, da mit dem stärkeren Franken nun günstiger eingekauft werden kann
- o Fokus auf verschiedene Gästegruppen aus unterschiedlichen Währungsräumen, um weniger von einzelnen Gruppen abhängig zu sein (bspw. durch Marketingaktivitäten)
- o Keine dieser Strategien

6. Welche weiteren Strategien nutzen Sie in Ihrem Hotel, um mit Währungsrisiken umzugehen? *(Mehrfachnennungen möglich)*

- o Bei Bezahlung gelten Preisangaben in Schweizer Franken (bspw. allfällige Europreisangaben nur zur Orientierung)
- o Erhöhung der Europreise aufgrund der Frankenaufwertung
- o Senkung der Preise in Schweizer Franken aufgrund der Frankenaufwertung
- o Gebrauch eines Eurokontos
- o Absicherung über Finanzinstitute (z.B. mit Termingeschäften)
- o Keine dieser Strategien
- o Andere Strategie: _____

7. Wie hoch schätzen Sie den Anteil Ihrer effektiven **Einnahmen in Euro** am Jahresumsatz ein? (*Bitte geben Sie einen Wert von 0% bis 100% an)*

_____ %

8. Wie hoch ist der ungefähre Anteil Ihrer Einnahmen am Jahresumsatz, die aufgrund von Angeboten mit **fixen Preisen in Euro** (z.B. ein Zimmer für 100 Euro) entstehen? (*Bitte geben Sie einen Wert von 0% bis 100% an)*

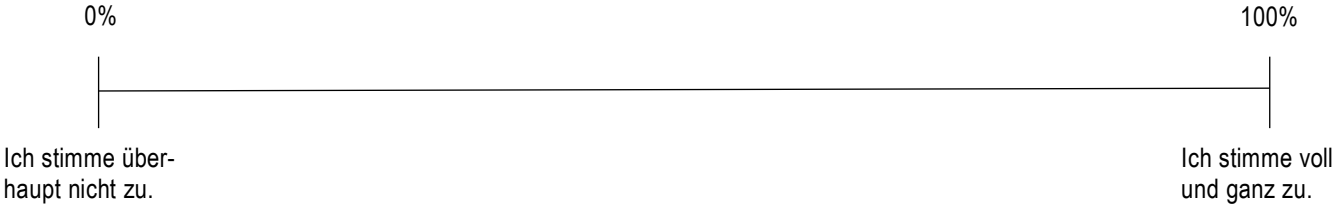
_____ %

9. Wie hoch ist der ungefähre durchschnittliche Anteil Ihrer **Ausgaben in Euro** (inkl. typische Investitionsausgaben) am gesamten Jahresumsatz in den letzten 5-10 Jahren? Denken Sie neben laufenden Ausgaben auch an Ausgaben wie bspw. Hotelsoftware, Bettwäsche, Mobiliar, Küchenmaschinen, Renovationen, Bau einer Sauna etc. (*Bitte geben Sie einen Wert von 0% bis 100% an)*

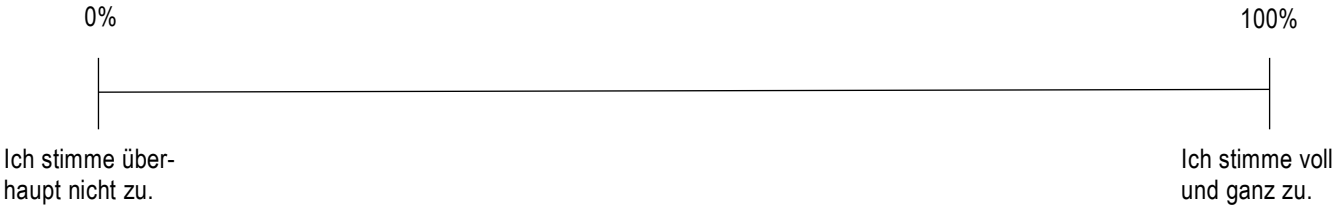
_____ %

10. Wie stehen Sie zu nachfolgenden Aussagen? Bitte benutzen Sie zu Ihrer Einschätzung den Schieberegler. Der Wert 0% bedeutet «Ich stimme überhaupt nicht zu», der Wert 100% bedeutet «Ich stimme voll und ganz zu». Mit den Werten dazwischen können Sie Ihre Einschätzung abstufen.

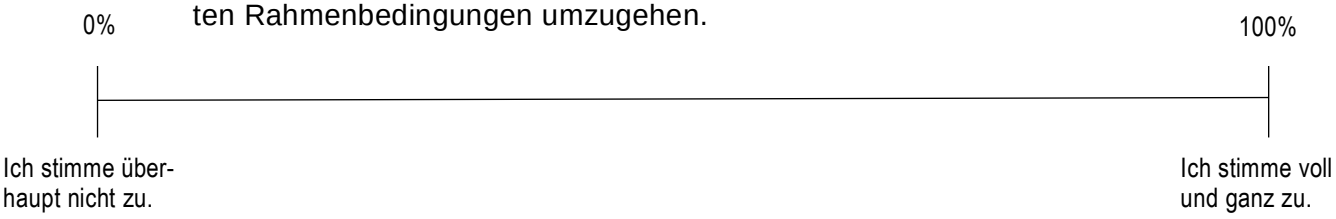
a. Wir verfügen über ausreichend personelle und zeitliche Kapazitäten, um uns falls gewünscht, mit gezielten Strategien (bspw. Importe aus dem Ausland oder Absicherung über Finanzinstitute) gegen Währungsrisiken abzusichern.



b. Wir verfügen über ausreichend Fachwissen oder Zugang zu Informationen, um falls gewünscht, unser Hotel selbstständig mit Instrumenten von Finanzinstituten (z.B. Termingeschäfte) gegen Währungsrisiken absichern zu können.



c. Auch selbstkritisch betrachtet weisen wir eine hohe Änderungsbereitschaft auf und suchen daher immerzu nach neuen Ideen für unser Hotel, um mit veränderten Rahmenbedingungen umzugehen.



Sie sind nun am Ende der Umfrage angelangt. Gibt es etwas, das Sie uns zum Thema Währungsrisiken und -strategien bezüglich Ihres Hotels noch mitteilen möchten?

Herzlichen Dank, dass Sie sich die Zeit genommen haben, an der Umfrage teilzunehmen! Sämtliche Informationen werden streng vertraulich behandelt.

Falls Sie an der Verlosung teilnehmen möchten, hinterlassen Sie bitte eine Kontaktinformation (Name und E-Mail bzw. Name und Telefonnummer).

5.A.2 Appendix II: Model specification and fit

Table 85 depicts the correlation coefficients between all independent variables. Multicollinearity seems not to be an issue, as none of the correlation coefficients is higher than 0.7 (knowledge and capacity have with 0.617 the highest correlation).

Table 85: Correlation matrix for all independent variables

	Star classification	*Location*	*# of rooms (log)*	*Foreign guests*	*Revenue in euro*	*Revenue fixed euro prices*	*Expenses in euro*	*Capacity*	*Innovation*	*Knowledge*
Star classification	1									
Location	0.0327	1								
# of rooms (log)	0.0474	-0.264	1							
Foreign guests	-0.0245	-0.208	0.260	1						
Revenue in euro	-0.0343	-0.0917	0.0193	0.290	1					
Revenue fixed euro prices	0.0437	0.00955	-0.0720	0.114	0.498	1				
Expenses in euro	0.0696	-0.188	0.242	0.210	0.357	0.278	1			
Capacity	-0.0404	0.0120	0.145	0.0660	0.0562	0.0757	0.0977	1		
Innovation	-0.0386	0.0709	0.126	0.0465	0.155	0.0294	0.0391	0.367	1	
Knowledge	-0.157	-0.0402	0.156	0.0118	0.0404	0.0985	0.110	0.617	0.387	1

Source: Own table based on survey data

Table 86 to Table 97 show if the models fit the data for the logistic regression models. Table 86 shows e.g. that the overall rate of correct classification is 81.50%, thus relatively high. Overall, the model fits are satisfactory; the lowest overall rate of correct

classification is 70.48% for the model estimating the use of matching without management characteristics (see Table 92) and the highest 88.21% for the model estimating the use of increase imports (see Table 94).

Table 86: Classification table for passing-through

Logistic model for passthrough

	True		
Classified	D	~D	Total
+	185	41	226
-	1	0	1
Total	186	41	227

Classified + if predicted Pr(D) >= .5
True D defined as passthrough != 0

Sensitivity	Pr(+| D)	99.46%
Specificity	Pr(-|~D)	0.00%
Positive predictive value	Pr(D| +)	81.86%
Negative predictive value	Pr(~D| -)	0.00%
False + rate for true ~D	Pr(+|~D)	100.00%
False - rate for true D	Pr(-| D)	0.54%
False + rate for classified +	Pr(~D| +)	18.14%
False - rate for classified -	Pr(D| -)	100.00%
Correctly classified		81.50%

Source: Own table based on survey data

Table 87: Classification table for passing-through (full model)

Logistic model for passthrough

	True		
Classified	D	~D	Total
+	138	27	165
-	4	6	10
Total	142	33	175

Classified + if predicted Pr(D) >= .5
True D defined as passthrough != 0

Sensitivity	Pr(+| D)	97.18%
Specificity	Pr(-|~D)	18.18%
Positive predictive value	Pr(D| +)	83.64%
Negative predictive value	Pr(~D| -)	60.00%
False + rate for true ~D	Pr(+|~D)	81.82%
False - rate for true D	Pr(-| D)	2.82%
False + rate for classified +	Pr(~D| +)	16.36%
False - rate for classified -	Pr(D| -)	40.00%
Correctly classified		82.29%

Source: Own table based on survey data

Table 88: Classification table for CHF invoicing

Logistic model for Swissfrancinvoicing

	True		
Classified	D	~D	Total
+	184	44	228
-	0	0	0
Total	184	44	228

Classified + if predicted Pr(D) >= .5
True D defined as Swissfrancinvoicing != 0

Sensitivity	Pr(+| D)	100.00%
Specificity	Pr(-|~D)	0.00%
Positive predictive value	Pr(D| +)	80.70%
Negative predictive value	Pr(~D| -)	.%
False + rate for true ~D	Pr(+|~D)	100.00%
False - rate for true D	Pr(-| D)	0.00%
False + rate for classified +	Pr(~D| +)	19.30%
False - rate for classified -	Pr(D| -)	.%
Correctly classified		80.70%

Source: Own table based on survey data

Table 89: Classification table for CHF invoicing (full model)

Logistic model for Swissfrancinvoicing

	True		
Classified	D	~D	Total
+	139	35	174
-	2	0	2
Total	141	35	176

Classified + if predicted Pr(D) >= .5
True D defined as Swissfrancinvoicing != 0

Sensitivity	Pr(+| D)	98.58%
Specificity	Pr(-|~D)	0.00%
Positive predictive value	Pr(D| +)	79.89%
Negative predictive value	Pr(~D| -)	0.00%
False + rate for true ~D	Pr(+|~D)	100.00%
False - rate for true D	Pr(-| D)	1.42%
False + rate for classified +	Pr(~D| +)	20.11%
False - rate for classified -	Pr(D| -)	100.00%
Correctly classified		78.98%

Source: Own table based on survey data

Table 90: Classification table for euro account

Logistic model for euroaccount

	True		
Classified	D	~D	Total
+	19	15	34
-	50	143	193
Total	69	158	227

Classified + if predicted Pr(D) >= .5
True D defined as euroaccount != 0

Sensitivity	Pr(+| D)	27.54%
Specificity	Pr(-|~D)	90.51%
Positive predictive value	Pr(D| +)	55.88%
Negative predictive value	Pr(~D| -)	74.09%
False + rate for true ~D	Pr(+|~D)	9.49%
False - rate for true D	Pr(-| D)	72.46%
False + rate for classified +	Pr(~D| +)	44.12%
False - rate for classified -	Pr(D| -)	25.91%
Correctly classified		71.37%

Source: Own table based on survey data

Table 91: Classification table for euro account (full model)

Logistic model for euroaccount

	True		
Classified	D	~D	Total
+	17	12	29
-	36	110	146
Total	53	122	175

Classified + if predicted Pr(D) >= .5
True D defined as euroaccount != 0

Sensitivity	Pr(+| D)	32.08%
Specificity	Pr(-|~D)	90.16%
Positive predictive value	Pr(D| +)	58.62%
Negative predictive value	Pr(~D| -)	75.34%
False + rate for true ~D	Pr(+|~D)	9.84%
False - rate for true D	Pr(-| D)	67.92%
False + rate for classified +	Pr(~D| +)	41.38%
False - rate for classified -	Pr(D| -)	24.66%
Correctly classified		72.57%

Source: Own table based on survey data

Table 92: Classification table for matching

Logistic model for Matching

	True		
Classified	D	~D	Total
+	4	3	7
-	64	156	220
Total	68	159	227

Classified + if predicted Pr(D) >= .5
True D defined as Matching != 0

Sensitivity	Pr(+| D)	5.88%
Specificity	Pr(-|~D)	98.11%
Positive predictive value	Pr(D| +)	57.14%
Negative predictive value	Pr(~D| -)	70.91%
False + rate for true ~D	Pr(+|~D)	1.89%
False - rate for true D	Pr(-| D)	94.12%
False + rate for classified +	Pr(~D| +)	42.86%
False - rate for classified -	Pr(D| -)	29.09%
Correctly classified		70.48%

Source: Own table based on survey data

Table 93: Classification table for matching (full model)

Logistic model for Matching

	True		
Classified	D	~D	Total
+	6	4	10
-	44	121	165
Total	50	125	175

Classified + if predicted Pr(D) >= .5
True D defined as Matching != 0

Sensitivity	Pr(+| D)	12.00%
Specificity	Pr(-|~D)	96.80%
Positive predictive value	Pr(D| +)	60.00%
Negative predictive value	Pr(~D| -)	73.33%
False + rate for true ~D	Pr(+|~D)	3.20%
False - rate for true D	Pr(-| D)	88.00%
False + rate for classified +	Pr(~D| +)	40.00%
False - rate for classified -	Pr(D| -)	26.67%
Correctly classified		72.57%

Source: Own table based on survey data

Table 94: Classification table for increase imports

Logistic model for IncreasedImports

	True		
Classified	D	~D	Total
+	0	0	0
-	27	202	229
Total	27	202	229

Classified + if predicted Pr(D) >= .5
True D defined as IncreasedImports != 0

Sensitivity	Pr(+| D)	0.00%
Specificity	Pr(-|~D)	100.00%
Positive predictive value	Pr(D| +)	.%
Negative predictive value	Pr(~D| -)	88.21%
False + rate for true ~D	Pr(+|~D)	0.00%
False - rate for true D	Pr(-| D)	100.00%
False + rate for classified +	Pr(~D| +)	.%
False - rate for classified -	Pr(D| -)	11.79%
Correctly classified		88.21%

Source: Own table based on survey data

Table 95: Classification table for increase imports (full model)

Logistic model for IncreasedImports

	True		
Classified	D	~D	Total
+	2	4	6
-	20	118	138
Total	22	122	144

Classified + if predicted Pr(D) >= .5
True D defined as IncreasedImports != 0

Sensitivity	Pr(+| D)	9.09%
Specificity	Pr(-|~D)	96.72%
Positive predictive value	Pr(D| +)	33.33%
Negative predictive value	Pr(~D| -)	85.51%
False + rate for true ~D	Pr(+|~D)	3.28%
False - rate for true D	Pr(-| D)	90.91%
False + rate for classified +	Pr(~D| +)	66.67%
False - rate for classified -	Pr(D| -)	14.49%
Correctly classified		83.33%

Source: Own table based on survey data

Table 96: Classification table for guest diversification

Logistic model for GuestDiversification

	True		
Classified	D	~D	Total
+	28	16	44
-	40	143	183
Total	68	159	227

Classified + if predicted Pr(D) >= .5
True D defined as GuestDiversification != 0

Sensitivity	Pr(+| D)	41.18%
Specificity	Pr(-|~D)	89.94%
Positive predictive value	Pr(D| +)	63.64%
Negative predictive value	Pr(~D| -)	78.14%
False + rate for true ~D	Pr(+|~D)	10.06%
False - rate for true D	Pr(-| D)	58.82%
False + rate for classified +	Pr(~D| +)	36.36%
False - rate for classified -	Pr(D| -)	21.86%
Correctly classified		75.33%

Source: Own table based on survey data

Table 97: Classification table for guest diversification (full model)

Logistic model for GuestDiversification

	True		
Classified	D	~D	Total
+	36	13	49
-	24	102	126
Total	60	115	175

Classified + if predicted Pr(D) >= .5
True D defined as GuestDiversification != 0

Sensitivity	Pr(+| D)	60.00%
Specificity	Pr(-|~D)	88.70%
Positive predictive value	Pr(D| +)	73.47%
Negative predictive value	Pr(~D| -)	80.95%
False + rate for true ~D	Pr(+|~D)	11.30%
False - rate for true D	Pr(-| D)	40.00%
False + rate for classified +	Pr(~D| +)	26.53%
False - rate for classified -	Pr(D| -)	19.05%
Correctly classified		78.86%

Source: Own table based on survey data

5.A.3 Appendix III: Logistic regression results with coefficients

Table 98: Coefficients for price policy & payment practices

	Pass-through	Pass-through	CHF invoicing	CHF invoicing	Euro account	Euro account
1-Star, 1-Star Superior,	0.513	-1.681	**-1.673***	**-2.233***	0.920	0.502
2-Star, 2-Star Superior	(0.651)	(0.306)	**(0.057)**	**(0.079)**	(0.299)	(0.612)
3-Star, 3-Star Superior	-0.893	**-2.534****	-0.875	**-2.021***	**1.090***	0.864
	(0.115)	**(0.030)**	(0.175)	**(0.061)**	**(0.056)**	(0.200)
4-Star, 4-Star Superior,	-0.677	**-2.155***	-0.777	**-2.003***	**1.547****	**1.775****
5-Star, 5-Star Superior	(0.328)	**(0.085)**	(0.295)	**(0.080)**	**(0.012)**	**(0.012)**
City	-0.209	-0.924	-0.830	-0.918	**-0.950***	-0.703
	(0.688)	(0.179)	(0.176)	(0.185)	**(0.054)**	(0.233)
Mountain area	0.278	-0.199	-0.682	-0.793	0.521	0.796
	(0.596)	(0.783)	(0.244)	(0.230)	(0.231)	(0.108)
# of rooms (log)	**0.793*****	**0.695****	-0.140	0.174	0.271	0.248
	(0.005)	**(0.030)**	(0.633)	(0.554)	(0.245)	(0.344)
Foreign guests	-1.129	-0.513	0.943	1.245	0.0174	-0.231
	(0.203)	(0.635)	(0.241)	(0.199)	(0.982)	(0.812)
Revenue in euro	-1.615	-1.755			-0.306	0.650
	(0.308)	(0.425)			(0.854)	(0.741)
Expenses in euro	-0.978	-1.516	1.119	0.848	0.425	0.274
	(0.582)	(0.497)	(0.544)	(0.692)	(0.806)	(0.896)
Capacity		0.0458		-1.291		0.490
		(0.960)		(0.117)		(0.472)
Innovation		**-1.235***		0.625		-0.117
		(0.089)		(0.396)		(0.854)
Knowledge		**1.732***		-0.0510		-0.364
		(0.074)		(0.944)		(0.550)
Constant	0.0255	2.354	2.943***	2.878**	-2.917***	-3.042***
	(0.982)	(0.187)	(0.008)	(0.049)	(0.005)	(0.004)
Observations	227	175	228	176	227	175
Pseudo R^2	0.069	0.139	0.034	0.071	0.098	0.126

*, **, and *** indicate significance at 10%, 5% and 1% levels, respectively

Source: Own table based on survey data

Table 99: Coefficients for operational hedging

	Matching	Matching	Increase imports	Increase Imports	Guest diversification	Guest diversification
1-Star, 1-Star Superior,	0.232	0.710	1.040	0	0.0188	0.516
2-Star, 2-Star Superior	(0.736)	(0.387)	(0.480)	(.)	(0.985)	(0.652)
3-Star, 3-Star Superior	0.410	0.524	1.422	0.370	**1.504***	**2.077***
	(0.379)	(0.386)	(0.172)	(0.594)	**(0.069)**	**(0.053)**
4-Star, 4-Star Superior,	-0.245	0.162	1.577	0	1.093	1.157
5-Star, 5-Star Superior	(0.661)	(0.811)	(0.128)	(.)	(0.199)	(0.304)
City	-0.286	-0.140	0.174	0.628	**-1.372****	**-1.677*****
	(0.533)	(0.792)	(0.823)	(0.653)	**(0.011)**	**(0.007)**
Mountain area	-0.483	-0.374	0.343	1.041	0.0459	-0.0454
	(0.248)	(0.446)	(0.612)	(0.385)	(0.928)	(0.934)
# of rooms (log)	-0.0927	-0.0947	0.326	**1.113****	**0.459***	0.477
	(0.681)	(0.710)	(0.386)	**(0.038)**	**(0.070)**	(0.108)
Foreign guests	-0.796	-0.334	-0.854	**-2.686***	**4.370*****	**5.640*****
	(0.288)	(0.718)	(0.414)	**(0.066)**	**(0.000)**	**(0.000)**
Revenue in euro	2.194	**3.153***	1.110	-0.334	-0.841	**-3.227***
	(0.137)	**(0.064)**	(0.508)	(0.895)	(0.588)	**(0.086)**
Expenses in euro	1.662	0.324			0.851	1.506
	(0.343)	(0.864)			(0.598)	(0.414)
Capacity		0.453		**2.165***		0.351
		(0.518)		**(0.070)**		(0.679)
Innovation		0.102		1.340		**1.998****
		(0.880)		(0.139)		**(0.016)**
Knowledge		0.0935		**-5.910*****		**-1.499***
		(0.892)		**(0.000)**		**(0.058)**
Constant	-0.318	-1.168	-4.547**	-6.021**	-5.256***	-6.806***
	(0.700)	(0.251)	(0.020)	(0.012)	(0.000)	(0.000)
Observations	227	175	229	144	227	175
Pseudo R^2	0.036	0.041	0.039	0.229	0.187	0.266

*, **, and *** indicate significance at 10%, 5% and 1% levels, respectively

Source: Own table based on survey data

5.A.4 Appendix IV: Regression results for robustness considerations

Table 100: Robustness considerations price policy & payment practices

	CHF invoicing	CHF invoicing	Euro account	Euro account
1-Star, 1-Star Superior,	**-0.276***	**-0.220***	0.134	0.0662
2-Star, 2-Star Superior	**(0.070)**	**(0.095)**	(0.346)	(0.620)
3-Star, 3-Star Superior	-0.0992	**-0.175*****	**0.168****	0.127
	(0.132)	**(0.005)**	**(0.018)**	(0.126)
4-Star, 4-Star Superior,	-0.0873	**-0.176****	**0.263*****	**0.311*****
5-Star, 5-Star Superior	(0.284)	**(0.021)**	**(0.003)**	**(0.002)**
City	-0.107	-0.106	**-0.156***	-0.105
	(0.132)	(0.179)	**(0.074)**	(0.270)
Mountain area	-0.0877	-0.0964	0.113	**0.162***
	(0.169)	(0.178)	(0.212)	**(0.083)**
# of rooms (log)	-0.0296	0.0176	0.0493	0.0430
	(0.509)	(0.693)	(0.268)	(0.371)
Foreign guests	0.162	0.198	0.00638	-0.0405
	(0.186)	(0.173)	(0.964)	(0.815)
Revenue in euro			-0.0513	0.122
			(0.871)	(0.730)
Expenses in euro	0.190	0.142	0.0794	0.0493
	(0.495)	(0.640)	(0.806)	(0.896)
NO passing-through	-0.0768	-0.0849	-0.0155	-0.0181
	(0.248)	(0.258)	(0.836)	(0.835)
Capacity		-0.193		0.0878
		(0.101)		(0.468)
Innovation		0.115		-0.0195
		(0.301)		(0.865)
Knowledge		-0.0307		-0.0687
		(0.774)		(0.541)
Observations	228	176	227	175

*, **, and *** indicate significance at 10%, 5% and 1% levels, respectively

Source: Own table based on survey data

Table 101: Robustness considerations operational hedging

	Matching	Matching	Increase imports	Increase Imports	Guest diversification	Guest diversification
1-Star, 1-Star Superior,	0.0455	0.140	0.0764	0	0.00174	0.0543
2-Star, 2-Star Superior	(0.743)	(0.385)	(0.500)	(.)	(0.987)	(0.641)
3-Star, 3-Star Superior	0.0859	0.102	**0.0805***	0	**0.209****	**0.286****
	(0.348)	(0.337)	**(0.092)**	(.)	**(0.028)**	**(0.012)**
4-Star, 4-Star Superior,	-0.0433	0.0304	**0.104****	0	0.142	0.139
5-Star, 5-Star Superior	(0.671)	(0.791)	**(0.050)**	(.)	(0.150)	(0.238)
City	-0.0607	-0.0266	0.00214	0.0179	**-0.216****	**-0.245****
	(0.540)	(0.812)	(0.976)	(0.872)	**(0.014)**	**(0.012)**
Mountain area	-0.101	-0.0734	0.0267	0.0639	0.00430	-0.00863
	(0.261)	(0.461)	(0.670)	(0.517)	(0.962)	(0.929)
# of rooms (log)	-0.0200	-0.0197	0.0523	**0.135****	**0.0812***	0.0748
	(0.668)	(0.698)	(0.179)	**(0.018)**	**(0.052)**	(0.107)
Foreign guests	-0.158	-0.0641	-0.125	**-0.304****	**0.705*****	**0.874*****
	(0.293)	(0.721)	(0.255)	**(0.044)**	**(0.000)**	**(0.000)**
Effective income euro	0.444	**0.614***	0.0415	-0.0876	-0.154	**-0.501***
	(0.130)	**(0.054)**	(0.825)	(0.750)	(0.550)	**(0.077)**
Expenses in euro	0.335	0.0677			0.133	0.232
	(0.335)	(0.853)			(0.616)	(0.413)
NO passing-through	-0.0127	-0.0150	**0.140*****	**0.132****	0.0599	0.00819
	(0.878)	(0.872)	**(0.003)**	**(0.043)**	(0.441)	(0.926)
Capacity		0.0877		0.204		0.0542
		(0.517)		(0.117)		(0.681)
Innovation		0.0221		0.0965		**0.309*****
		(0.867)		(0.294)		**(0.009)**
Knowledge		0.0145		**-0.534*****		**-0.231***
		(0.913)		**(0.000)**		**(0.056)**
Observations	227	175	229	144	227	175

*, **, and *** indicate significance at 10%, 5% and 1% levels, respectively

Source: Own table based on survey data

Table 102: Robustness considerations extent of hedging (continuous dependent variables)

	Imports	Imports	Matching	Matching	FXRMI	FXRMI
1-Star, 1-Star Superior,	0.00938	-0.0124	0.0393	0.0155	-0.0177	0.0154
2-Star, 2-Star Superior	(0.747)	(0.718)	(0.191)	(0.640)	(0.676)	(0.732)
3-Star, 3-Star Superior	-0.0255	-0.0321	0.0165	-0.000765	0.0398	**0.0559***
	(0.141)	(0.149)	(0.341)	(0.971)	(0.136)	**(0.079)**
4-Star, 4-Star Superior,	-0.00997	-0.0147	0.0113	-0.00615	**0.0556***	**0.0647***
5-Star, 5-Star Superior	(0.623)	(0.541)	(0.581)	(0.789)	**(0.080)**	**(0.058)**
City	0.0256	0.0247	-0.0178	-0.0142	**-0.0827*****	**-0.0675*****
	(0.151)	(0.263)	(0.329)	(0.500)	**(0.001)**	**(0.008)**
Mountain area	0.0199	0.0126	-0.0167	-0.0138	0.0149	0.0314
	(0.230)	(0.538)	(0.324)	(0.480)	(0.566)	(0.223)
# of rooms (log)	**0.0163***	**0.0241****	-0.00749	-0.00266	**0.0276***	**0.0384****
	(0.071)	**(0.022)**	(0.409)	(0.787)	**(0.066)**	**(0.028)**
Foreign guests	0.0224	0.0174	-0.0416	-0.0366	**0.134*****	**0.145*****
	(0.418)	(0.602)	(0.124)	(0.231)	**(0.001)**	**(0.002)**
Revenue in euro	**0.298*****	**0.313*****			-0.132	-0.220
	(0.000)	**(0.000)**			(0.259)	(0.116)
Revenue due to fixed euro prices			**-0.354*****	**-0.368*****		
			(0.000)	**(0.000)**		
Expenses in euro					0.140	0.165
					(0.209)	(0.147)
NO passing-through	0.00619	0.0148	-0.0125	-0.0133	0.0338	0.0134
	(0.683)	(0.411)	(0.416)	(0.439)	(0.257)	(0.702)
Capacity		0.00410		0.0171		0.0192
		(0.880)		(0.504)		(0.626)
Innovation		-0.0255		-0.00754		**0.101*****
		(0.303)		(0.750)		**(0.006)**
Knowledge		0.0288		-0.0270		**-0.131*****
		(0.267)		(0.276)		**(0.001)**
Constant	-0.0469	-0.0591	-0.00991	-0.0114	0.0883	-0.000583
	(0.152)	(0.152)	(0.765)	(0.770)	(0.113)	(0.993)
Observations	227	175	223	172	227	175
R^2	0.200	0.222	0.221	0.274	0.161	0.259
Adjusted R^2	0.167	0.165	0.188	0.219	0.122	0.200

*, **, and *** indicate significance at 10%, 5% and 1% levels, respectively

Source: Own table based on survey data

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Selbständigkeitserklärung

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Yelka Eggenschwiler